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April 28, 2025

VIA EMAIL

Mackenzie Valley Land and Water Board
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Attention: Erica Janes, Regulatory Specialist, and
Angela Love, Regulatory Specialist

Re: Westcoast Energy Inc. (Westcoast)
Pointed Mountain Pipeline Abandonment Project (Project)
Water Licence MV2023L1-0013 (Licence)
Part I: Closure and Reclamation, Condition 1
Closure and Reclamation Plan

As required by Condition #1 of Part I: Closure and Reclamation of the Licence, Westcoast provides the attached updated Closure and Reclamation Plan for the Project.

If you have any questions concerning this matter, please do not hesitate to contact me at (587) 338-4058 or by email at deon.bridge@enbridge.com.

Yours truly,

Deon Bridge
Specialist

Enclosure

Revision History

#	Section (s) Revised	Description of Revision	Issue Date
0			November 17, 2023
1	4,5	1. Revised hectares for TWS 2. Removed "or seeded with an appropriate native seed mix." In Table 1: Project Construction Activities	January 17, 2024
2		1. Updated 2.3 to include reference to where EPP is located (GNWT#7) 2. Updated 9.1.1. to include reference to timing for development of PCEM Plan. (GNWT#8) 3. Updated document with information directly from the Environmental and Socio-economic Assessment (GNWT #9) 4. Updated document with information directly from the Environmental and Socio-economic Assessment (GNWT#10) 5. Attached Remedial Action Plan for PM-1 (GNWT #21) 6. Attached Phase I and Phase II ESAs (GNWT #22) 7. Updated 5.2.1.5 to include list of bridge repairs/temporary bridges (GNWT#23) 8. Updated 5.2.1.3 to include barge details (GNWT#24) 9. Updated 5.2.3 with additional closure objective details (GNWT#25) 10. Updated 5.2.4 with additional monitoring details (GNWT#26) 11. Attached Gantt Chart (GNWT#28) 12. Updated Table 3 with additional grading information (GNWT#31) 13. Updated Table 3 with additional third party crossing details (GNWT#34) 14. Added details on Pre-Disturbance, Closure Options, Engineered Structures, Predicted Residual Effects, Uncertainties and Contingencies (GNWT#37) 15. Added "Restoring disturbed areas to as close as preconstruction conditions as practical" under closure objectives (MVLWB #36) 16. Updated Table 3 with stripping information (MVLWB#37) 17. Updated Table 5 with closure options (MVLWB #45) 18. Updated Table 5 and 9.1.1 to include discussion	May 2024

#	Section (s) Revised	Description of Revision	Issue Date
		on PCM (MVLWB#47 and #48) 19. Added Gantt Chart (MVLWB#50) 20. Added missing sections (MVLB#50) 21. Updated Follow up and Monitoring with additional monitoring details (ECCC#9)	
3	1. Throughout and Appendix 2. Closure Objectives and Criteria 3. Throughout	1. Information from other plans added to document per GNWT intervention, or attached: a. PM-1 Remedial Action Plan (attached); b. Environmental Protection Plan (incorporated, not attached); c. Phase I Environmental Site Assessment (attached); d. Environmental and Socio-economic Assessment (incorporated, not attached) 2. Updated the closure criteria to ensure they are measurable and to include temporal components per GNWT intervention. 3. Reorganized document to closely match Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories	April 2025

Westcoast Energy Inc.

Pointed Mountain Pipeline Abandonment Closure and Reclamation Plan

April 2025

Table of Contents

1.0 Plain Language Summary

This plan details how Westcoast Energy Inc. (Westcoast) will permanently decommission its Pointed Mountain Pipeline (the "Project").

The Pointed Mountain Pipeline was constructed in 1972. In 2008, KP 0 to KP 34.92 was deactivated pursuant to National Energy Board (NEB) Order MO-11-2008. In April 2016, a 1,200 m segment of the pipeline crossing the Kotaneelee River was decommissioned pursuant to NEB Order MO-071-2015. The remainder of the Pointed Mountain Pipeline (KP 34.92 to KP 55.64) was deactivated in July 2016 pursuant to NEB Order MO-003-2016.

Since the Pointed Mountain Pipeline has no prospective future use, Westcoast is planning to take it permanently out of service by moving it to the abandonment phase. The pipeline has been deactivated, which included being purged, cleaned of residual product, internally coated with corrosion inhibitor, and physically isolated from sources of upstream pressure. The pipeline has also been filled with nitrogen gas to a minimum pressure of 70 kilopascals.

Abandonment involves removing aboveground facilities associated with the pipeline and disconnecting cathodic protection. An exposed section of pipeline will also be cut and removed as part of the Project scope. The rest of the buried pipeline will be abandoned in place with appropriate signage installed.

Physical abandonment activities are planned to commence in Fall 2025 with demobilization and closure activities completed by March 2026. Reclamation and post-construction monitoring will be ongoing.

2.0 Introduction

2.1 Purpose and Scope of the Closure and Reclamation Plan

The purpose of this Plan is to:

- Meet the intent of the Guidelines for Closure and Reclamation.
- Provide a description of the current baseline conditions of areas that will be disturbed as part of the Project and require a Land Use Permit and Water License.
- Establish closure objectives and criteria in alignment with the four core closure principles of (1) physical stability, (2) chemical stability, (3) no long-term active care requirement, and (4) future use; and,
- Provide a schedule of reclamation activities and post-construction monitoring activities.

This Plan is applicable to the portion of the Project in the Northwest Territories (NWT).

2.2 Goal of the Closure and Reclamation Plan

In accordance with the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB and AANDC 2013), the goal of the Plan is to outline how the areas disturbed by the Project will be reclaimed to a natural and self-sustaining ecosystem that supports a healthy environment and human activities. Throughout this document, the term "equivalent land capability" is defined as the ability of the land to support various land uses after reclamation, similar to its ability before the disturbance. This means that the reclaimed land should be capable of supporting natural and self-sustaining ecosystems that are compatible with adjacent native land uses, a healthy environment and human activities.

2.3 Closure and Reclamation Planning Team

The Project Team is led by the Westcoast Project Manager, who has the ultimate responsibility for the overall Project and the reclamation of the Project areas, manages the Project budget, and approves remedial action plans, as required.

The Construction Manager reports directly to the Project Manager and oversees the Construction Contractor when construction activities are occurring on site. The Construction Manager is responsible for managing the execution of remedial action plans, as required.

The Environmental Inspector works directly with the Construction Manager and reports to the Project Environment Lead on the status of the Project. The Environmental Inspector works with the Construction Manager to ensure all Project personnel are aware of the environmental conditions, commitments and guidelines for the Project and that the Project is executed in compliance with the Environmental Protection Plan (EPP) and all applicable regulatory permits and approvals. A copy of the EPP can be found on the MVLWB registry.

The Project Environment Lead is responsible for overseeing the Environmental Consultant, who is contracted to complete the Post-Construction Monitoring (PCM) program. Assuming construction work is completed by end of Q1 2026, the PCM Plan may be finalized by the end of Q2 2026.

2.4 Engagement

Westcoast has conducted extensive engagement on the Project as detailed in the Engagement Plan and Record filed with the MVLWB.

Westcoast has engaged with local and directly impacted Indigenous groups since early 2020 through meetings and site visits.

Westcoast has maintained ongoing communication with Indigenous groups and other stakeholders throughout the planning phases of the Project, with a view to continue through both construction and post-construction phases.

Site tours will be offered to Indigenous groups and other stakeholders impacted by the project during construction and post-construction activities. Indigenous participation in environmental monitoring is captured in project plans, agreements and written commitments. Westcoast will continue to engage with Indigenous groups to identify work opportunities for Indigenous businesses or partnerships, either directly with Westcoast or indirectly via general contractors. This continuous engagement extends into post-construction work.

2.5 Regulatory Instruments for Closure and Reclamation

Below is a list of federal and territorial legislation that may apply to the Project.

Table 1: List of Potentially Applicable Legislation

Acts	Regulations
Federal	
Canadian Energy Regulator Act	Canadian Energy Regulator Onshore Pipeline Regulations
Species at Risk Act	N/A
Migratory Birds Convention Act	N/A
Fisheries Act	N/A
Canadian Navigable Waters Act	N/A
Canadian Environmental Protection Act, 1999	Regulations Respecting Reduction in the Release of Methane and Certain Volatile Organic Compounds (Upstream Oil and Gas Sector).
Yukon Environmental and Socio-Economic Assessment Act	N/A
Mackenzie Valley Resource Management Act	Mackenzie Valley Land Use Regulations
Northwest Territories	
Environmental Protection Act	N/A
Species at Risk (NWT) Act	N/A
Wildlife Act	N/A
Waters Act	Waters Regulations
Historical Resources Act	N/A
Forest Protection Act	N/A
Archaeological Sites Act	Archaeological Sites Regulations

The permits, licences and other authorizations that have been obtained or may be required for the Project in the NWT include the following:

- Leave to abandon order pursuant to subsection 241(1) of the Canadian Energy Regulator Act (Canada)
- Scientific research licence pursuant to section 3 of the Scientists Act (NWT) (obtained to conduct field studies in 2021 and 2023)
- Wildlife research permit pursuant to section 84 of the Wildlife Act (NWT) (obtained to conduct field studies in 2021 and 2023)
- Class 2 archeological permit pursuant to section 4 of the Archaeological Sites Regulations (NWT) (obtained to conduct field studies in 2021 and required to conduct field studies in 2022)
- Land use permit pursuant to section 4 or 5 of the Mackenzie Valley Resource Management Act (NWT)
- Water licence pursuant to section 47 of the Waters Act (NWT)

Existing permits, licences and other authorizations that may be relevant to the Project include:

- Archaeological Impact Assessment (Permits 2021-004 and 2022-006) have been completed and reports were submitted to the Prince of Wales Northern Heritage Centre. Acceptance letters were issued by the Department of Education, Culture, and Employment on July 12, 2022, for AIA 2021-004 and on February 28, 2023, for AIA 2022-006.
- The pipeline was constructed in 1972 pursuant to National Energy Board (NEB) Certificate GC-46 and deactivated pursuant to NEB Order MO-11-2008 (for mile posts 0 to 21.71) and NEB Order MO-003-2016 (for mile posts 21.7 to 34.62).

3.0 Project Environment

The Project environment is described in terms of Atmospheric Environment, Physical (Terrestrial) Environment, Chemical Environment, and Biological Environment in accordance with the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB and AANDC 2013).

Prior to the construction of the pipeline, the Project footprint was generally undisturbed lands.

3.1 Atmospheric Environment

The Project is located mainly on forested land with limited anthropogenic activities. The existing air quality conditions were characterized through a review of ambient air quality monitoring data. The results from regional ambient air quality monitoring stations were reviewed to determine ambient contaminant concentrations. Data from representative monitoring stations were obtained to estimate regional background concentrations and the status

of compliance with AAQOs for the CACs of interest. All selected monitoring stations are located closer to populated areas (e.g., cities and towns) than to the Pointed Mountain Pipeline, which affects the representativeness of the data to the Project location. Therefore, these ambient air quality data are a conservative estimate of ambient CAC concentrations at the Project footprint.

Table 2 provides summary reports of average concentrations of the CACs of interest measured at representative stations in 2018.

Table 2: Summary of Ambient Criteria Air Contaminants Concentrations at Monitoring Stations near the Project Footprint

CACs and Measurement Averages (Units)	NWT AAQOs	YAAQS	BC AAQOs	CAAQS	Average Concentration at Representative Monitoring Stations
NO_2 (ppb)					
1-hour	213	60	60	60 (2020) 42 (2025)	28.7[a] 18.1[b]
CO (ppb)					
1-hour	13,000	13,000	13,000	N/A	1,200[c]
8-hour	5,000	5,000	5,000	N/A	700[c]
$PM_{2.5}$ ($\mu g/m^3$)					
24-hour	28	27	25	27 (2020)	14.8[a]
Annual	10	8.8	8	8.8 (2020)	8.2[d]

Notes:

[a] Available data of parameters measured in 2018 at the Norman Wells monitoring station in the Northwest Territories, located approximately 560 km north of the Project location (Government of the NWT 2018b).

[b] Available data of parameters measured from June 2016 to June 2017 by a portable monitoring station at the Blueberry River First Nation School in northeast BC, located approximately 400 km southeast of the Project location (Government of BC 2017).

[c] Available data of parameters measured in 2018 at the Fort Smith monitoring station in the NWT, located approximately 670 km east of the Project location (Government of the NWT 2018b).

[d] Available data of parameters measured in 2016 at the Hidden Valley monitoring site in the City of Whitehorse, Yukon, located approximately 620 km west of the Project (Government of Yukon 2018).

3.2 Physical (Terrestrial) Environment

The Project is located in the Liard Plateau of the Mackenzie Mountain Area physiographic region (Bostock 1967). Ranging from undulating to steep slopes, elevations range from 290 metres above sea level (masl) to 550 masl. Till blanket, fine-grained lacustrine sediments and

undifferentiated colluvial sediments are the dominant surficial geology (NRCan 2021). The bedrock formation underlying the Project area is characterized by Upper Paleozoic Siliciclastic/Carbonate Shelf (Ootes et al. 2013). This portion of the Project runs along the Canadian Cordillera's Foreland Belt's boundary with the Interior Plains (Wetmiller et al. 1988). Several thrust faults exist in this area, and seismic activity is known to occur, with a 6.6 magnitude earthquake occurring on October 5, 1985 and a 6.9 magnitude earthquake occurring on December 23, 1985 (Wetmiller et al. 1988). Both earthquakes occurred at the same epicentre, approximately 92 km north of PM-1 (Ootes et al. 2013; Wetmiller et al. 1988).

3.3 Chemical Environment

3.3.1 Soil Overview

The Project is located mainly on forested land. In forested areas, the uppermost layer is often referred to as strippings, which includes organic litter, fine woody material and portions of the mineral A horizon located within the rootzone (often the upper 15 cm). Soil productivity is generally defined as the capacity for soil to support healthy plant growth. The capability of soil to support the plant growth is reduced if the soil becomes compacted. Compaction affects soil capability by reducing porosity, thereby restricting root penetration and elongation, and restricting air and water movement. Compaction will be greatest if soil handling and equipment movement occurs during wet/thawed soil conditions. If the soils are frozen during physical activities, compaction is not as likely to occur (Jacobs 2022a).

Wind erosion risk is considered negligible and therefore, unrated by Natural Resources Canada along the existing pipeline right-of-way (ROW) (NRCan 2009).

Potential of water erosion is influenced by factors such as texture, available soil moisture, organic matter content, surface cover, slope, and rainfall intensity. Moderate water erosion risk is generally associated with fine-textured topsoil where they occur on slopes greater than 5 percent. Project activities are generally considered to present low water erosion risk. Physical abandonment activities will be conducted within the existing ROW and associated temporary workspace.

A search of the Federal Contaminated Sites Inventory (Treasury Board of Canada Secretariat 2021) did not return any results of known contamination along the ROW (Jacobs 2022a). The nearest known federal contaminated site to the Project is located approximately 14 km southeast of the existing ROW (Treasury Board of Canada Secretariat 2021).

No sites of known contamination are listed on the Government of Canada's NWT Contaminated Sites List (Government of Canada 2013). However, a diesel spill was reported in 2018 at PM-1. A Phase 1 Environmental Site Assessment (ESA) was conducted to identify areas of potential environmental concern (APECs) at which contaminants of potential concern (COPCs) may have been released into the surrounding environment as a result of historical operations (Jacobs 2022b). The identified APECs and PCOCs are summarized in Table 5-1 of

the Phase 1 ESA (Jacobs 2022b).

Based on the findings of the Phase 1 ESA, soil investigations (Jacobs 2024a,b) were conducted at PM-1. The soil investigations identified concentrations of petroleum hydrocarbon (PHC) fractions 1 to 3, ethylbenzene, naphthalene, and phenanthrene in soil greater than applicable federal and territorial guidelines. The estimated impacted soil volume is 1,350 cubic metres.

3.3.2 Surface Water Quality

The Project is located in an area with many poorly defined watercourses and fens commonly occurring along the existing ROW. The Project watercourse and wetland crossings are all within the Liard River Basin. The La Biche River and Kotaneelee River are direct tributaries to the Liard River. Fisherman Lake has an unnamed outflow on the southern end of the lake that flows into the Liard River.

The Liard River Basin is a transboundary watershed with headwaters in the southern portion of the Yukon. The Liard River flows southeast across the British Columbia (BC) border then northward across the NWT border to where it eventually meets the confluence with the Mackenzie River. The Liard River Basin area is approximately 275,000 square kilometres and is the ninth largest in Canada (Mackenzie River Water Board 2003).

3.3.3 Groundwater Quality

The Liard River Basin Transboundary Aquifer Assessment compiled a large amount of groundwater information for the NWT portions of the Liard River Basin (Palmer 2020). There are potential Type 1 surficial aquifers along the La Biche River and Kotaneelee River valleys. Type 1 are often composed of well sorted sand/gravel as they originate from deposition of materials from flowing water. These aquifers are hydrologically connected with surface waters and contain permeable materials; therefore, they may be vulnerable to groundwater contamination. Otherwise, there is low surficial aquifer potential (Jacobs 2022a).

No wells or springs were found within 50 m of the Project in the NWT (Jacobs 2022a).

There is no potential for acid rock drainage or metal leaching, as the Project does not include mining, milling or quarrying of rock (Jacobs 2022a).

3.4 Biological Environment

The following subsections provide an overview of the biological environment in the Project area including vegetation, wetlands, aquatics (fish and fish habitat), wildlife and wildlife habitat, species at risk or species of special status. The information is based on desktop reviews and field investigations conducted for the Project.

3.4.1 Vegetation

The Project is predominantly located in an area consisting of forested areas and wetlands.

Vegetation concerns are related to vegetation and landscape health, wildlife habitat, and spread of weeds. Project activities have the potential to interact with native vegetation mainly through brushing, grubbing, grading, and revegetation (Jacobs 2022a). The existing Pointed Mountain Pipeline crosses the Liard Upland Mid-Boreal Ecoregion in the Taiga Plains Ecological Region (Ecosystem Classification Group 2007) and the Liard Range Mid-Boreal boreal-subalpine Ecoregion in the Cordillera Ecological Region of the NWT (Ecosystem Classification Group 2010).

Vegetation field surveys were conducted within and along the Project footprint in the NWT. Field surveys focused on sites where physical abandonment activities will take place. Vegetation present at the physical abandonment sites includes the following:

- PM-1 is within a regenerating forest dominated by a combination of trembling aspen, white spruce, balsam poplar and black spruce. There are also shrub, cleared and disturbed land covers at this site.
- PM-2 is within a regenerating forest dominated by a combination of trembling aspen, white spruce, balsam poplar and black spruce. There is also cleared land cover at this site.
- PM-3 is within a shrub land cover due to clearing for construction and maintenance of the pipeline.
- PM-4 is within a shrub land cover due to beaver activity within a shrub swamp and clearing for construction and maintenance of the pipeline.
- PM-4A is located on the existing regenerating pipeline footprint, dominated by shrubs within wetlands.

The Project is within the Dehcho administrative region of the NWT, which recently reported the following forest pests: aspen serpentine leafminer, eastern larch beetle, gray willow leaf beetle, spruce budworm, willow blotch leafminer, western balsam bark beetle, and white-spotted sawyer beetle (Government of the Northwest Territories [GNWT] 2018). No evidence of forest pests or pathogens was observed.

No rare vegetation species or rare ecological communities were observed.

Two invasive weed species designated Most Concern (Northwest Territories Environment and Natural Resources [2020]), white sweet-clover and yellow sweet-clover, were observed at PM-1. Additional invasive weed species were observed at this site that are not designated species in the NWT, but are designated as Highly Invasive in the adjacent Yukon, perennial sow-thistle, annual hawksbeard and oxeye daisy. Invasive weed species were associated with existing disturbance and infrastructure. No weeds were observed at the other physical abandonment sites.

3.4.1.1 Vegetation Species at Risk

There are three species with federal conservation status known to occur in the NWT

(Government of Canada 2021):

- hairy braya (*Braya pilosa*, listed as Endangered by COSEWIC and *SARA*, and listed as Threatened by the *Species at Risk [NWT] Act*)
- Mackenzie hairgrass (*Deschampsia mackenzieana*, listed as Special Concern by COSEWIC and *SARA*)
- Nahanni aster (*Symphyotrichum nahanniense*, listed as Special Concern by COSEWIC and *SARA*)

None of these species at risk are known to occur in the range of the Project (GNWT 2020).

Raup's willow (*Salix raupii*, May Be at Risk), a territorially listed species, occurs within 5 km of the Pointed Mountain Pipeline (GNWT 2013), located approximately 3.1 km east of the Project footprint between PM-1 and PM-2.

No rare vegetation species or rare ecological communities were observed during field surveys at the physical abandonment sites.

3.4.2 Wetlands

A substantial proportion of the existing Pointed Mountain Pipeline ROW crosses wetlands (Jacobs 2022a). Wetland regions in Canada are defined by wetland ecosystems that develop in locations with similar topography, hydrology, and nutrient regime. The Project is located within the Continental High Boreal Subregion of the Boreal Wetland Region and the Central Rocky Mountain Wetland Region of the Mountain Wetland Region. Characteristic Continental High Boreal wetlands consist of treed bogs and fens on broad flats and in confined basins. Swamp and marsh wetlands can be found in agricultural areas, as well as along edges of some streams and lakes. Peat depth for Continental High Boreal wetlands averages 2 to 3 m (Energy, Mines and Resources Canada 1986).

Central Rocky Mountain wetlands within the Rocky Mountain Wetland Region. Characteristic Central Rocky Mountain wetlands include bogs and fens. Peat accumulation is typically less than 1 m (Energy, Mines and Resources Canada 1986).

The Project components in the NWT are located within the Liard Upland Mid-Boreal Ecoregion in the Taiga Ecological Region and the Liard Range Ecoregion in the Cordillera Ecological Region of the NWT. Less than five percent of the total area of the Liard Upland Mid-Boreal Ecoregion is covered by water. The undulating terrain limits wetlands in this area. In the Liard Range Ecoregion, there are few lakes and wetlands. Lakes and wetlands are common in broad valley bottoms, and include shore and floating sedge fens and black spruce fens.

3.4.3 Aquatics (fish and fish habitat)

Fish documented in the Liard River include Arctic cisco, Arctic grayling, bull trout, burbot,

chinook salmon, chum salmon, Dolly Varden, finescale dace, flathead chub, goldeye, inconnu, lake chub, lake trout, lake whitefish, longnose dace, longnose sucker, mountain whitefish, northern pearl dace, northern pike, pygmy whitefish, rainbow trout, round whitefish, slimy sculpin, spoonhead sculpin, trout-perch, walleye and white sucker (Government of British Columbia 2021a,b,c; McPhail 2007). Documented fish presence was not found for Fisherman Lake; however, based on the size and connectivity to other waterbodies, it is presumably fish-bearing.

Chinook salmon are a vagrant historical record in the Liard River and unlikely to occur with any regularity in the Liard River (McLeod and O'Neil 1983). The Liard River is also notable for having a small and possibly sporadic chum salmon run from the Beaufort Sea (McLeod and O'Neil 1983). This is the only anadromous salmonid species noted to occur historically with some regularity within the Mackenzie River basin, of which the Liard River is a part of (McLeod and O'Neil 1983). Dolly Varden are present in the upper Liard River basin, although some historical records indicate that these are likely bull trout from when the two char were considered the same species (McPhail 2007).

No information was available for the watercourses crossed by the pipeline route on the Fish Sampling Atlas (Community Mapping Network 2021). No additional fisheries information was found for the NWT, as information is limited (Jacobs 2022a). The Project crosses tributaries of the Kotaneelee River system in the NWT, where bull trout (Special Concern under SARA) are also known to occur (Stewart et al. 2007). Stewart et al. noted that stream resident populations of bull trout are likely present in the Kotaneelee River system. Stream resident populations indicate they are non-migratory and inhabit spawning tributaries year-round (Stewart et al. 2007).

3.4.3.1 Fish Species at Risk

The fish community for the area surrounding the existing Pointed Mountain Pipeline includes coolwater and coldwater species and spring/summer/fall spawners. Generally, most of the watercourses identified by desktop review appear to be low gradient, poorly defined, and may lack habitat potential for sportfish (e.g., bull trout, Arctic grayling, and northern pike) (Jacobs 2022a). A notable exception is the La Biche River, which supports a diverse fish community and is expected to provide high quality fish habitat.

Bull trout (Western Arctic) are federally listed as Special Concern under *SARA* and COSEWIC (Government of Canada 2021). Bull trout are also listed as Sensitive by the NWT (Working Group on General Status of NWT Species 2016). Dolly Varden (Western Arctic population) are also federally listed as Special Concern under *SARA* and COSEWIC (Government of Canada 2021); however, they are only documented in the headwaters of the Liard River basin and are unlikely to be present at the Liard River ice bridge location (Jacobs 2022a).

3.4.4 Wildlife and Wildlife Habitat

The Pointed Mountain Pipeline crosses the Liard Upland Mid-Boreal Ecoregion in the Taiga Ecological Region (Ecosystem Classification Group 2007) and the Liard Range Ecoregion in the Cordillera Ecological Region of the NWT (Ecosystem Classification Group 2010), the La Biche River Boreal Low Subzone of the Yukon (Environment Yukon 2017), and the BWBSmk BGC subzone of BC (DeLong et al. 2011); these areas are home to a variety of wildlife species, including wood bison, moose, black bear, boreal caribou, gray wolf, beaver and other furbearers, as well as songbirds, game birds, and water birds. Hunting, fishing, and trapping occur within all of these regions (Jacobs 2022a).

The Pointed Mountain Pipeline does not cross designated parks, National Wildlife Areas, or Migratory Bird Sanctuaries (Environment and Climate Change Canada [ECCC] 2019, 2020), Important Bird Areas (Bird Studies and Nature Canada 2004-2010), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2019), Ducks Unlimited Canada Projects (Ducks Unlimited Canada 2018), or Ramsar Wetlands (Bureau of the Convention on Wetlands 2016) (Jacobs 2022a).

The Pointed Mountain Pipeline overlaps with the western edge of boreal caribou range of the NWT (NT1); the range is one of three transboundary ranges in Canada and is large (44,166,546 ha), extending from the southern border of the NWT into the north with some overlap of the Yukon. In comparison to smaller boreal caribou ranges, those in NT1 are dispersed over a large area and may move more freely and over greater distances within the area characterized by common biophysical attributes (Jacobs 2022a).

3.4.4.1 Wildlife Species at Risk

The pipeline ROW is within the western edge of the NT1 caribou range for approximately 26.5 km. PM-1, PM-2, PM-3, and PM-4 are located within the NT1 caribou range (Jacobs 2022a). This area is considered critical habitat, as it could contribute to the undisturbed habitat needed for self-sustaining boreal caribou populations (ECCC 2020). However, the undisturbed critical habitat in NT1 is estimated to be at 65 percent, which is the target amount for all boreal caribou populations. Anthropogenic disturbance is relatively low and is estimated to be around 9 percent (ECCC 2020).

In the NWT, an approach to range planning for boreal woodland caribou is outlined in A Framework for Boreal Caribou Range Planning (NWT Framework) (GNWT 2019). The NWT Framework addresses obligations to protect critical habitat for boreal caribou identified in ECCC's National Recovery Strategy for Woodland Caribou, Boreal Population (Environment Canada 2012) as well as the territorial recommendations to develop and implement range plans for boreal caribou habitat outlined in the NWT Boreal Caribou Recovery Strategy (Conference of Management Authorities 2017). The NWT Recovery Strategy calls for the development of regional range plans focused on managing human disturbance, while the National Recovery

Strategy sets a target of maintaining at least 65 percent of the NT1 range in an undisturbed condition.

Although there are no current boreal caribou range plans in effect, the NWT Framework takes a tiered management approach in which caribou habitat is assigned to different management classes (Basic, Enhanced, and Intensive) based on importance of habitat for caribou and range status relative to regional human disturbance thresholds. Though the NWT Framework defines the tiers, specific areas assigned to each of the three management classes will be defined spatially when range plans are developed. Areas in enhanced and intensive management classes will be subject to stricter requirements and conditions with the intent of achieving No Net Loss (or increase) of undisturbed habitat due to human activity over time.

Because of the paucity of potential caribou habitat (e.g., presence of wood bison along the ROW) and lack of caribou observations in the area where abandonment activities will take place, the relative importance of the area for boreal caribou can be considered low (Jacobs 2022a). Combined with the relatively low human disturbance level in NT1 (9 percent), high-level management actions outlined in the NWT Framework for this Basic Management Class area include:

- encouraging use of best practices and minimum standards (including actions to manage sensory disturbance, and actions specific to seasonal use of habitats); and/or
- managing of wildfires as per current GNWT Policy

4.0 Project Description

4.1 Location and Access

The portion of the Project located in the NWT is approximately 26 km northwest of the hamlet of Fort Liard in a remote area that is currently only accessible over land by a winter road that is typically in service from December to early April. The Project area can also be accessed in the summer months by barging on the Liard River.

4.2 Site History

The Project uses Westcoast's existing permanent easement and previous workspace to the extent possible. In particular, the proposed camp and laydown yard are situated in a disturbed area that was previously used as a construction camp and is adjacent to an existing road.

4.3 Site Geology

In the NWT, the existing Pointed Mountain Pipeline is located in the Liard Plateau of the Mackenzie Mountain Area physiographic region (Bostock 1967). Ranging from undulating to steep slopes, elevations range from 290 metres above sea level (masl) to 550 masl. Till blanket, fine-grained lacustrine sediments and undifferentiated colluvial sediments are the dominant

surficial geology (NRCan 2021). The bedrock formation underlying the Project area is characterized by Upper Paleozoic Siliciclastic/Carbonate Shelf (Ootes et al. 2013). This portion of the Project runs along the Canadian Cordillera's Foreland Belt's boundary with the Interior Plains (Wetmiller et al. 1988). Several thrust faults exist in this area, and seismic activity is known to occur, with a 6.6 magnitude earthquake occurring on October 5, 1985 and a 6.9 magnitude earthquake occurring on December 23, 1985 (Wetmiller et al. 1988). Both earthquakes occurred at the same epicentre, approximately 92 km north of PM-1 (Ootes et al. 2013; Wetmiller et al. 1988).

4.4 Project Summary

The Project will use existing access roads, as well as the following temporary infrastructure to accommodate construction activities:

- Construction camp;
- Laydown yard (fuel and equipment storage);
- Potential barge landing to stage equipment for winter construction;
- Temporary workspaces (TWS); and
- Ice bridges at Petitot River, Liard River and Kotaneelee River.

Further details on the Project components are provided in Section 5.2.

The general activities associated with construction of the Project are described in Table 3.

Table 3: Project Construction Activities

Construction Stage	Associated Activities
Engineering	The pipeline and surface equipment will be abandoned in accordance with all applicable industry standards (e.g., Canadian Standards Association [CSA]), as well as federal, territorial, and regional requirements, and conditions of permits or authorizations.
Surveying	Activities include flagging and staking the boundaries of the Project footprint, including TWS, as well as marking the existing ROW and utilities. Avoidance areas (e.g., protected habitats or rare plants) will be appropriately fenced or flagged.
Transportation of equipment, workers, and supplies	Supplies and equipment will be transported to the Project footprint using large trucks and trailers. Workers will use multipassenger vehicles and trucks for travel to and from the Project footprint for the duration of the physical abandonment schedule. Heavy equipment will travel along the ROW, as needed.

Construction Stage	Associated Activities
Brushing	Vegetation (i.e., stumps, brush, and other vegetation) and snow will be cleared from the Project footprint, as needed, to facilitate physical abandonment activities. Vegetation will be brushed in required locations including TWS and access along the ROW. Equipment used during brushing may include mulchers, or other clearing equipment, such as dozers
Vegetation disposal	Where possible, brush and trees will be reused by spreading over cleared areas as cover.
Strippings handling (forested lands)	In forested areas, the uppermost ground layer is referred to as “strippings”, which includes organic litter, fine woody material and portion of the mineral A horizon located within the rootzone (often upper 15 cm). As a result, the term “strippings handling” is used in forested areas, instead of “soils handling”. Strippings will be salvaged in areas where excavation is required to access belowground piping. The width and depth of strippings salvage depends on several factors, including the soil conditions at the time of abandonment and microtopography. Typical equipment used during strippings handling activities includes backhoes and excavators.
Grading/site preparation	Grading will be conducted on slopes and irregular ground surfaces, TWS, and access roads in order to provide a safe work surface. The camp site and laydown area are already level and do not require grading. TWS and access roads are all pre-existing, principally flat surfaces, which require minimal soil grading, if any. The pipeline ROW does not require any soil grading. No fill material is required at any of these locations, other than snow fill.
Excavation	Excavation will occur where the pipeline will be exposed to enable cutting and capping. Typical equipment used for excavation includes backhoes and tracked excavators.
Depressurization and capping	Following principles in the latest edition of CSA Z662-23, the existing pipeline will be depressurized, capped, plugged, and left without any internal pressure. The pipeline will be capped at start and end points, third-party connections, and flare sites.
Watercourses	All watercourse crossings will be abandoned in-place to avoid disturbance to the watercourse, except for an exposed section of pipe at KP 28.6 that will be removed. The section of pipe under the Kotaneelee River was removed in 2016.
Third-party crossings	Pipeline sections that cross third-party pipelines will be abandoned in-place, unless otherwise required, to eliminate the risk of contact with the third-party pipeline during removal. No pipeline sections that cross third-party pipelines are currently planned for excavation.

Construction Stage	Associated Activities
Backfilling	Excavation areas will be backfilled using backhoes, excavators, graders, dozers, or other specialized backfilling equipment. Excavations/bell holes will be backfilled using native spoil material.
Waste disposal	Household waste and sewage from the camp will be disposed of in facilities in Fort Liard. All other construction waste will be removed to a facility in BC, Yellowknife or elsewhere in the NWT. Only licensed facilities capable of accepting the types of wastes will be used.
Site dismantle	Any aboveground piping and appurtenances associated with the Pointed Mountain Pipeline will be dismantled and removed from the site. Cathodic protection for the pipeline will be disconnected. Supports and utilities will be removed to pipeline depth below ground unless still required and owned by third-party operators. All third-party connections will be disconnected.
Cleanup and reclamation (forested lands)	Upon completion of abandonment activities, cleanup, and reclamation procedures will be initiated following backfilling using dozers, backhoes, or graders. Any remaining garbage or debris will be removed and disposed of in compliance with applicable regulations and as described in the Waste Management Plan. Strippings, where salvaged, will be replaced. All disturbed, upland areas will be revegetated using natural recovery.
Remediation of Contaminated Soil	Westcoast completed a Phase I Environmental Site Assessment (ESA) to identify areas requiring soil sampling. A copy of the Phase I ESA is attached (Appendix 2). Of the abandonment sites in the NWT (i.e., PM-1 to PM-4), only PM-1 required soil sampling. As part of the abandonment process, contaminated soil has been identified at PM-1. The contaminated soil will be remediated on-site and replaced to its original location. The remediation will be completed using Enhanced Thermal Conductance treatment. Remediation treatment success will be confirmed by laboratory analysis of soil samples. Further details on the remediation at PM-1 are available in the attached Remedial Action Plan (Appendix 3). Any other soil found with olfactory or visual indications of contamination will be analyzed. Olfactory indicators of contamination include hydrocarbon and solvent odours. Visual indicators of contamination include discolored (grey or black) staining of soils and sheen on water in excavations. If contamination is confirmed, the site will be remediated to the appropriate land use criteria.

5.0 Permanent Closure and Reclamation

Westcoast has determined that there is no prospective future use for the Pointed Mountain Pipeline. The approximately 56 km long 20 inch diameter natural gas pipeline was constructed in 1972 and deactivated in 2008 (for mile posts 0 to 21.71) and 2016 (for mile posts 21.7 to 34.62). A 1.2 km long segment of pipeline crossing the Kotaneelee River was removed in 2016. As part of the deactivation process, the pipeline was purged, cleaned of residual product, internally coated with corrosion inhibitor, filled with nitrogen gas to a minimum pressure of 70 kilopascals, and physically isolated from sources of upstream pressure.

Generally, abandonment in-place is the most appropriate method of abandonment of buried pipelines. This is primarily because the environmental disturbance that would be caused by excavation and disposal of buried pipeline would be far greater than abandonment in place and unwarranted in the case of this remote, predominantly forested, and uninhabited land. The physical removal of the pipeline would require disturbance of the vegetation and the brush that has re-grown on the ROW, thus potentially impacting caribou, and other wildlife habitat. Westcoast further notes that this approach is consistent with the Canada Energy Regulator's base case assumption for small-diameter pipe in undeveloped land use areas.

5.1 Definition of Permanent Closure and Reclamation

In the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB and AANDC 2013), permanent closure and reclamation is defined as follows:

> *Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining.*

In the context of the Project, it can be interpreted that permanent closure of the Project means that Westcoast has no intentions of conducting further activities at the site, aside from routine operations and maintenance monitoring and potential remedial actions (when and where required).

5.2 Permanent Closure and Reclamation Requirements

Permanent closure and reclamation requirements are described in the following subsections for the Project components listed in Section 5.2.1, including:

- Construction camp and laydown yard;
- Potential barge landing;
- Existing access roads;
- Bridge Repairs;
- Ice Bridges; and

- TWS.

5.2.1 Project Component Descriptions

5.2.1.1 Project Sites

Physical abandonment activities (e.g., excavation, isolation, backfilling) of the Pointed Mountain Pipeline will occur at four site locations within the NWT, and exposed pipe will be removed at one location within the NWT (Table 4).

Table 4: Pointed Mountain Pipeline - Associated Facility Components

Site #	Site Name & GPS Coordinates	KP	Abandonment Activities
PM-1	Pointed Mountain Launcher (Original) *GPS 60.3968, -123.8263*	KP 0.0	Remove pig launcher and associated kicker line, flare, aboveground flare piping, aboveground producer connection piping, structural steel, risers, diesel and propane tanks
PM-2	Producer Tie-In *GPS 60.3053, -123.8923*	KP 11.1	Remove tap, piping, and valve.
PM-3	N2 Vent *GPS 60.2490, -123.9447*	KP 18.04	Remove riser piping and valve.
PM-4	N2 Vent *GPS 60.2419, -123.9618*	KP 19.25	Remove riser piping and valve.
PM-4a	Pipe Exposure *GPS 60.165, -124.0125*	KP 28.6	Remove exposed pipe and additional pipe that is predicted to be potentially exposed in the future. The pipe will be cut and capped at both ends of the exposure extent, and the pipe will be removed by pulling it from one side.
Test Lead Posts	Various	Various	Remove above ground Test Lead Posts where feasible.

5.2.1.2 Camp Site by Fort Liard Town and Laydown Yard by PM-1

One camp is required for the portion of the Project in the NWT. The camp will be located in the Beaver Enterprise Yard in Fort Liard, located by Valley Main Street. The camp will be located in a previously cleared area. The camp will be capable of accommodating up to 60 people with the following structures:

- (8) trailers camp complex
- (2) wet sleepers
- (1) wellsite trailer

- (1) fuel storage area (with secondary containment and spill kits)
- (1) generator shack

A laydown area by PM-1 will be used for fuel and equipment storage on previously disturbed land. It will have the following structures:

- (1) wash car trailer
- (1) office trailer
- (1) generator shack
- (2) propane tanks

The camp location and laydown yard will not require any vegetation clearing.

5.2.1.3 Potential Barge Landing

Equipment may be barged to a landing site on the north side of the Liard River. Barging may be used if the water level is sufficiently high and if the risk of late freeze-up is deemed material to mitigate the risk that late freeze-up delays construction.

Westcoast anticipates minimal grading of the barge landing site may be required. No construction at the barge landing site is anticipated. The barge landing site is a flat pre-disturbed area that has been used for barge landing previously.

The barging activity and equipment is generally described below. The specific equipment details may vary:

1. The tug boat will be 50 ft long, 800 hp.
2. The barge will be 30 ft wide and 120 ft long
3. Capacity of the barge is estimated at 250,000 tons.
4. There will be an estimated 5 cross river trips to carry over the following equipment:
    a. 1 – Supply trailer / 20 ft long storage container / C-can
    b. 2 – pickup trucks each with a 450L tidy tank of diesel
    c. 1 – snow cat
    d. 1 – D6 Dozer
    e. 1 – 200 series excavator
    f. 1 – 40 ft temporary bridge
    g. 1 – power generator
    h. Drip trays, spill containment and spill response equipment.
5. The duration of barging is expected to be 5 days.

5.2.1.4 Existing Access Roads

Access during physical abandonment activities will be via existing roads (e.g., Highway 77 and high-grade petroleum development roads), resource and winter roads, ice bridges (across Petitot River, Liard River and Kotaneelee River), and the existing ROW to the Project sites.

Highway 77 will be used to transport equipment / materials to the proposed camp site. The road does not require any vegetation clearing or brushing.

A temporary connector road will be used for access from Petitot River to Liard River.

Along the access roads and ROW the following temporary structures will be provided:

- (2) portable toilets; and
- Approximately (12) light stands.

5.2.1.5 Bridge Repairs and Temporary Bridges

There may be some bridge repairs required. Westcoast has conducted bridge inspections to ensure safe access and will install temporary bridges as required prior to the construction window in early Fall.

The following is a list of permanent bridges which may require repairs and a list of potential temporary bridges:

- Winter Connector Road KP 1.75
  - Location: 60.218102, -123.498357
  - Work Scope: Bridge has been washed out. Replace with a temporary 80’-90’ bridge.
  - Size: Bridge Length 18.3m, Span Length: 18.3m, Deck Width 4.3m
- Paramount Road 1, KP 2
  - Location: 60.206016, -123.670933
  - Work Scope: None at this time
  - Size: Bridge Length 18.3m, Span Length: 18.3m, Deck Width 4.1m
- Paramount Road 2, KP 17.5
  - Location: 60.330319, -123.769753
  - Work Scope: None at this time
  - Size: Bridge Length 21.3m, Span Length: 21.3m, Deck Width 4.3m
- Paramount Road 3, KP 21.5
  - Location: 60.337298,-123.82985
  - Work Scope: Bridge is to be replaced by installing a longer bridge on new abutments that are set back from the top of the embankment.
  - Size: Bridge Length 15.3m, Span Length: 15.3m, Deck Width 4.3m

- Paramount Road 4, KP 23
    - Location: 60.395166,-123.850161
    - Work Scope: Rebuild rig mat abutments, remove beaver dam, and reinstate displaced delineators.
    - Size: Bridge Length 18.3m, Span Length: 18.3m, Deck Width 4.3m

Temporary Bridges:

The final number, size, and location of temporary bridges will be confirmed following a contractor walkthrough of the Project. Westcoast currently anticipates four temporary bridges on Prairie Road Bridge (approximately 60.343583°, -123.854011° to 60.305176°, -123.893341°) along with the Winter Connector temporary bridge. Once construction activities associated with the Project are complete, the temporary bridges will be removed. Based on MVLWB's definition of "Engineered Structure", temporary bridges would only qualify as engineered structures if they are installed below the normal high water mark of a waterbody.

5.2.1.6 Ice Bridges

There will be three (3) ice bridges built to access the Project sites in the NWT. From Fort Liard, an ice bridge will be installed at the Petitot River (IB-01) to facilitate temporary access west along an existing 12 km access trail (connector road). An ice bridge will be installed at the Liard River (IB-02) to facilitate access to the GNWT Access Road, which travels north to the ROW. From there the GNWT Access Road extends northeast directly to PM-1, and the other GNWT Access extends south, paralleling the ROW, allowing access to PM-2. From PM-2, the existing ROW will be used to access PM-3 through PM-4, with an ice bridge installed at the Kotaneelee River (IB-03).

If safe and feasible, a v-notch will be placed in the center of the ice bridges (or otherwise breached) when the crossing season is complete to prevent blocking fish passage, channel erosion and flooding, and to facilitate drainage flows. If ice bridges cannot safely or feasibly be breached, and there are no concerns with fish passage, channel erosion and flooding, they will be left to melt naturally after the abandonment activities.

5.2.1.7 Temporary Workspaces

Some TWS outside of the existing ROW will be required. TWS off the existing ROW may require brushing, however, no merchantable timber is expected to be removed.

The total number of hectares to be used in each phase of the Project is provided below.:

- Camp at Fort Liard: 5.62 ha. This includes 4.808 ha for the camp and 0.812 ha for the access road into the camp from Valley Main Street.
- Laydown Area: 1.57 ha

- Total Access Road: 110.987 ha
- Total ROW: 56.803 ha
- PM-1 lease and additional TWS: 2.11 ha
- PM-2 lease and additional TWS: 0.226 ha
- PM-3 lease and additional TWS: 0.213 ha
- PM-4 lease and additional TWS: 0.191 ha
- PM-4A lease and additional TWS: 0.402

5.2.2 Final Site Conditions

The following will be done once all abandonment activities are completed and prior to expiration of the land and water use permits.

- **Buildings and Contents**

  The camp and other small buildings will be removed. All equipment and other building contents will be removed from the site.

  Final inspection will be made after removal of the camp to ensure that no waste or other materials remain. Photos will be taken to record the final condition.

- **Fuel Tanks and Chemical Containers**

  All fuel tanks and chemical containers will be removed from the camp and other locations. Fuel tank locations will be inspected, and final photos will be taken of all sites.

- **Re-vegetation**

  Disturbance to vegetation will be minimal along the ROW where used for winter access, and will be left to revegetate naturally. At physical abandonment sites where ground disturbance occurs, the preferred revegetation method is natural regeneration. Seeding will occur at PM-1 following remediation activities.

- **Final Inspection and Documentation**

  Upon completion of the final abandonment and reclamation, photos will be taken, and activities documented.

5.2.3 Closure Objectives and Criteria

The closure objectives for the Project have been guided by the four closure principles outlined in the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB and AANDC 2013): (1) physical stability, (2) chemical stability, (3) no long-term active care, and (4) future use. Closure objectives and criteria have been developed for the Project Components located within land uses where

physical abandonment activities will occur. The campsite, laydown area, and existing access roads have not been included in this process, as they are located within existing anthropogenic land uses. The existing pipeline ROW that will be used for temporary access, and the existing trail that will be used for temporary access have not been included in this process as no ground disturbance is planned for these locations.

Closure objectives and criteria are provided in Table 5.

Table 5: Closure Criteria

Closure Objective	Closure Options	Closure Criteria
PM-1		
At closure, the site will support early successional native vegetation characteristic of the surrounding adjacent native land use (Liard Upland Mid-boreal Ecoregion of the Taiga Plains Ecological Region [Ecosystem Classification Group 2007] zonal upland site). Due to wood bison presence in this area, early successional native vegetation may not include many woody-species. Should wood bison grazing result in the site maintaining a grassland or shrubland structural stage, the site will still be considered successfully reclaimed.	**Remove above-ground infrastructure** Remove pig launcher and associated kicker line, flare, aboveground flare piping, aboveground producer connection piping, structural steel, risers, diesel and propane tanks. -Timing: By end of March 2026 *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Above ground pipeline equipment has been removed and disposed of at an appropriate facility.
	Remediate contaminated soil and impacted groundwater Delineate, excavate and treat contaminated soil at PM-1 as per Remedial Action Plan. Remediate impacted groundwater at PM-1 by removing source of contamination (contaminated soil). -Timing: By end of March 2026 Return treated soil, which meets applicable regulatory criteria, to excavation in 200 to 300 mm lifts, and compact to restore grade. -Timing: By end of March 2026 Conduct post-remediation groundwater monitoring. -Timing: By end of December 2026 *Applicable Closure Principles:* *(2) chemical stability, and* *(4) future use*	• Meet or exceed the Canadian Council of Ministers of the Environment Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, as describe in Exhibit 2 of the Remedial Action Plan. • Post-remediation groundwater COPC concentrations are less than the applicable federal and territorial guidelines, as follows: o Canadian Council of Ministers of the Environment (CCME) Canadian WQGs for the Protection of Agricultural Water Uses (CCME 2024a) o CCME Canadian WQGs for the Protection of Aquatic Life (CCME 2024b) o CCME Canadian Groundwater Quality Guidelines for the Protection of Human Health (CCME 2024c) o Environment and Climate Change Canada (ECCC) provides Federal Environmental Quality Guidelines (FEQGs) (Government of Canada 2024)

Closure Objective	Closure Options	Closure Criteria
		○ Federal Contaminated Sites Action Plan (FCSAP) Federal Interim Groundwater Quality Guidelines (FIGQGs) (Government of Canada 2016) ○ Health Canada Guidelines for Canadian Drinking Water Quality (CDWQs) (Health Canada 2024) • The criteria for identified contaminants in groundwater are as follows: ○ Naphthalene: 1.1 micrograms per litre (µg/L) Source: CCME Water Quality Guideline and FIGQG ○ PHC F2: 1,300 µg/L. Source: FIGQC Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Import topsoil, if available, to a depth of approximately 15 cm to support native vegetation only in areas where contaminated soil was remediated -Timing: By end of March 2026 *Applicable Closure Principles:* *(2) chemical stability,* *(3) no long-term active care, and* *(4) future use*	• Criteria is adapted from *Soil Quality Criteria Relative to Disturbance and Reclamation* for the Northern Forested Region (Soil Quality Criteria Working Group et. al. 2004). Topsoil will be sourced locally, if possible, and be free of weeds or contamination. The following criteria for evaluation the suitability of surface material for revegetation in a forested region should be considered, if possible. The ratings are considered Good for reclamation suitability. If Good ratings are not obtainable locally, variations may be acceptable based on adjacent soil conditions or using the Fair ratings from the same criteria. pH: Good: 5.0 to 6.5; Fair: 4.0 to 5.0, 6.5 to 7.5 • Electric Conductivity (EC)(dS/m): Good: <2; Fair: 2 to 4 • Sodicity (SAR): Good: <4; Fair: 4 to 8 • Saturation (%): Good: 30 to 60; Fair: 20 to 30, 60 to 80 • Stoniness/Rockiness (%area): Good: <30/<20; Fair: 30

Closure Objective	Closure Options	Closure Criteria
		to 50/20 to 40 • Texture[1]: Good: FSL, VFSL, L, SiL, SL; Fair: CL, SCL, SiCL • Moist Consistency: Good: very friable to friable; Fair: loose, firm • $CaCO_3$ Equivalent (%): Good: <2; Fair: 2 to 20
	Waste Disposal All wastes generated during the Project are disposed of in a licensed facility as per the Waste Management Plan. Materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, etc.). -Timing: By end of March 2026 *Applicable Closure Principles:* *(3) no long-term active care, and* *(4) future use*	• No wastes or construction materials at site.
	Return the landscape to contours compatible with adjacent native land uses, ensuring slope and soil stability is maintained. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Contour/Grade and drainage re-establishment: o Surface contours match the surrounding landscape. o Un-natural ponding is not observed on- or up gradient from the site. • Microtopography: o No evidence of subsidence that is affecting drainage, vegetation establishment or is a physical hazard to humans or wildlife. o No evidence of rutting caused by construction that is altering drainage or vegetation establishment, resulting in bare ground. • Erosion:

Closure Objective	Closure Options	Closure Criteria
		○ No erosion beyond typical erosion observed in adjacent areas. ○ No visibly unstable slopes. ○ No sedimentation due to the Project. • Surface stoniness or debris: ○ Stoniness is rated on a scale from S0 to S5. There should be no S4 or S5 ratings, unless adjacent lands are similar (Appendix 1). ○ If present, coarse woody debris (CWD) is at a density that is not restricting vegetation establishment from reaching 75% cover (or cover that is comparable to adjacent lands). ○ If present, mulch depth does not exceed 5 cm, unless there are no effects on vegetation establishment. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Soil is capable of supporting the desirable vegetation community. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• No compaction that causes vegetation to not meet vegetation closure criteria. • No admixing that causes vegetation to not meet vegetation closure criteria. • Topsoil depth should be within 85% of imported target depth, where applicable, or 60% of control locations, unless no effects to vegetation establishment are observed. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Apply native seed mix only in areas where contaminated soil was remediated.	• At least 3 ecologically suitable species growing onsite to promote species diversity.

Closure Objective	Closure Options	Closure Criteria
	• See Appendix 5 for seed mix information. • Prioritize choosing local or northern seed sources for reclamation. • Seed Mix A for upland areas can be used for dormant seeding as these are cool season grasses. Can include a short-lived cover crop for soil stabilization of slopes. -Timing: Early April 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Less than 25% cover bare soil per plot. • Total desirable vegetation species cover (natural regeneration or seeded) and litter greater than 75% cover per plot. • Vegetation health (rated on a scale of 1 to 4) does not decrease by more than one rating (described below) from control locations(s): 1. Healthy with no signs of stress of decrease in vigour. 2. Less than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 3. Greater than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 4. Plants are diseased or dying. • No increase in density or distribution of weeds (Appendix 1) per plot compared to the adjacent native reference area(s). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate. Reference area(s) will be established within the adjacent native vegetation community to compare onsite and offsite vegetation conditions.
PM-2		
At closure, the site will support early successional native vegetation characteristic of the surrounding adjacent	**Remove above-ground infrastructure** Remove tap, piping, and valve. -Timing: By end of March 2026 *Applicable Closure Principles:*	• Above ground pipeline equipment has been removed and disposed at an appropriate facility.

Closure Objective	Closure Options	Closure Criteria
native land use (Liard Upland Mid-boreal Ecoregion of the Taiga Plains Ecological Region [Ecosystem Classification Group 2007] zonal upland site). Due to wood bison presence in this area, early successional native vegetation may not include many woody-species. Should wood bison grazing result in the site maintaining a grassland or shrubland structural stage, the site will still be considered successfully reclaimed.	*(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	
	Waste Disposal All wastes generated during the Project are disposed of in a licensed facility as per the Waste Management Plan. Materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, etc.). -Timing: By end of March 2026 *Applicable Closure Principles:* *(3) no long-term active care, and* *(4) future use*	• No wastes or construction materials at site.
	Return the landscape to contours compatible with adjacent native land uses, ensuring slope and soil stability is maintained. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Contour/Grade and drainage re-establishment: o Surface contours match the surrounding landscape. o Un-natural ponding is not observed on- or up gradient from the site. • Microtopography: o No evidence of subsidence that is affecting drainage, vegetation establishment or is a physical hazard to humans or wildlife. o No evidence of rutting caused by construction that is altering drainage or vegetation establishment, resulting in bare ground. • Erosion: o No erosion beyond typical erosion observed in adjacent areas. o No visibly unstable slopes.

Closure Objective	Closure Options	Closure Criteria
		○ No sedimentation due to the Project. • Surface stoniness or debris: ○ Stoniness is rated on a scale from S0 to S5. There should be no S4 or S5 ratings, unless adjacent lands are similar (Appendix 1). ○ CWD is at a density that is not restricting vegetation establishment from reaching 75% cover (or cover that is comparable to adjacent lands). ○ Mulch depth does not exceed 5 cm, unless there are no effects on vegetation establishment. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Soil is capable of supporting the desirable vegetation community. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• No compaction causing vegetation to not meet vegetation closure criteria. • No admixing causing vegetation to not meet vegetation closure criteria. • Topsoil depth should be within 60% of control locations, unless no effects to vegetation establishment are observed. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Natural regeneration No seeding recommended for revegetation because no steep slopes, no observed weeds, and seed bank will be maintained. -Timing: By end of March 2026 and to be verified through the PCM program, which is plot based for vegetation. *Applicable Closure Principles:*	• At least 3 ecologically suitable species growing onsite. • Less than 25% cover bare soil per plot. • Total desirable vegetation species cover (natural regeneration or seeded) and litter greater than 75% cover per plot. • Vegetation health (rated on a scale of 1 to 4) does not decrease by more than one rating from control

Closure Objective	Closure Options	Closure Criteria
	(1) physical stability, *(3) no long-term active care, and* *(4) future use*	locations(s): 1. Healthy with no signs of stress of decrease in vigour. 2. Less than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 3. Greater than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 4. Plants are diseased or dying. • No increase in density or distribution of weeds (Appendix 1) per plot compared to the adjacent native reference area(s). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate. Reference area(s) will be established within the adjacent native vegetation community to compare onsite and offsite vegetation conditions.
PM-3		
At closure, the site will support early successional native vegetation characteristic of the surrounding adjacent native land use (Liard Upland Mid-boreal Ecoregion of the Taiga Plains Ecological Region [Ecosystem Classification Group 2007] zonal upland site).	**Remove above-ground infrastructure.** Remove riser piping and valve -Timing: By end of March 2026 *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Above ground pipeline equipment has been removed and disposed at an appropriate facility.
	Waste Disposal All wastes generated during the Project are disposed of in a licensed facility as per Waste Management	• No wastes or construction materials at site.

Closure Objective	Closure Options	Closure Criteria
Due to wood bison presence in this area, early successional native vegetation may not include many woody-species. Should wood bison grazing result in the site maintaining a grassland or shrubland structural stage, the site will still be considered successfully reclaimed.	Plan. Materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, etc.). -Timing: By end of March 2026 *Applicable Closure Principles:* *(3) no long-term active care, and* *(4) future use*	
	Return the landscape to contours compatible with adjacent native land uses, ensuring slope and soil stability is maintained. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Contour/Grade and drainage re-establishment: o Surface contours match the surrounding landscape. o Un-natural ponding is not observed on- or up gradient from the site. • Microtopography: o No evidence of subsidence that is affecting drainage, vegetation establishment or is a physical hazard to humans or wildlife. o No evidence of rutting caused by construction that is altering drainage or vegetation establishment, resulting in bare ground. • Erosion: o No erosion beyond typical erosion observed in adjacent areas. o No visibly unstable slopes. o No sedimentation due to the Project. • Surface stoniness or debris o Stoniness is rated on a scale from S0 to S5. There should be no S4 or S5 ratings, unless adjacent lands are similar (Appendix 1). o If present, CWD is at a density that is not

Closure Objective	Closure Options	Closure Criteria
		restricting vegetation establishment from reaching 75% cover (or cover that is comparable to adjacent lands). o If present, mulch depth does not exceed 5 cm, unless there are no effects on vegetation establishment. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Achieve soil quality capable of supporting desirable vegetation community. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• No compaction causing vegetation to not meet vegetation closure criteria. • No admixing causing vegetation to not meet vegetation closure criteria. • Topsoil depth should be within 60% of control locations, unless no effects to vegetation establishment are observed. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Natural regeneration No seeding recommended for revegetation because no steep slopes, no observed weeds, and seed bank will be maintained. -Timing: By end of March 2026 and to be verified through the PCM program, which is plot based for vegetation. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• At least 3 ecologically suitable species growing onsite. • Less than 25% cover bare soil per plot. • Total desirable vegetation species cover (natural regeneration or seeded) and litter greater than 75% cover per plot. • Vegetation health (rated on a scale of 1 to 4) does not decrease by more than one rating from control locations(s): 1. Healthy with no signs of stress of decrease in vigour. 2. Less than 25% of plants show signs of decreased health (changes in colour, or signs of stress or

Closure Objective	Closure Options	Closure Criteria
		disease). 3. Greater than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 4. Plants are diseased or dying. • No increase in density or distribution of weeds (Appendix 1) per plot compared to the adjacent native reference area(s). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate. Reference area(s) will be established within the adjacent native vegetation community to compare onsite and offsite vegetation conditions.
PM-4		
At closure, the site will support early successional native vegetation characteristic of the surrounding adjacent native land use (Liard Upland Mid-boreal Ecoregion of the Taiga Plains Ecological Region [Ecosystem Classification Group 2007] swamp wetland).	**Remove above-ground infrastructure** Remove riser piping and valve -Timing: By end of March 2026 *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Above ground pipeline equipment has been removed and disposed at an appropriate facility.
	Waste Disposal All wastes generated during the Project are disposed of in a licensed facility as per Waste Management Plan. Materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, etc.). -Timing: By end of March 2026	• No wastes or construction materials at site.

Closure Objective	Closure Options	Closure Criteria
	Applicable Closure Principles: *(3) no long-term active care, and* *(4) future use*	
	Return the landscape to contours compatible with adjacent native land uses, ensuring slope and soil stability is maintained. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Contour/Grade and drainage re-establishment: o Surface contours match the surrounding landscape. o Un-natural ponding is not observed on- or up gradient from the site. • Microtopography: o No evidence of subsidence that is affecting drainage, vegetation establishment or is a physical hazard to humans or wildlife. o No evidence of rutting caused by construction that is altering drainage or vegetation establishment, resulting in bare ground. • Erosion: o No erosion beyond typical erosion observed in adjacent areas. o No visibly unstable slopes. o No sedimentation due to the Project. • Surface stoniness or debris: o Stoniness is rated on a scale from S0 to S5. There should be no S4 or S5 ratings, unless adjacent lands are similar (Appendix 1). o If present, CWD is at a density that is not restricting vegetation establishment from reaching 75% cover (or cover that is comparable to adjacent lands). o If present, mulch depth does not exceed 5 cm, unless there are no effects on vegetation establishment.

Closure Objective	Closure Options	Closure Criteria
		• Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Soil is capable of supporting the desirable vegetation community. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• No compaction causing vegetation to not meet vegetation closure criteria. • No admixing causing vegetation to not meet vegetation closure criteria. • Topsoil depth should be within 60% of control location, unless no effects to vegetation establishment are observed. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Natural regeneration No seeding recommended for revegetation because no steep slopes, no observed weeds, and seed bank will be maintained. -Timing: By end of March 2026 and to be verified through the PCM program, which is plot based for vegetation. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• At least 3 ecologically suitable species growing onsite. • Less than 25% cover bare soil per plot. • Total surface water, desirable vegetation species cover (natural regeneration or seeded) and litter greater than 75% cover per plot. • Vegetation health (rated on a scale of 1 to 4) does not decrease by more than one rating from control locations(s): 1. Healthy with no signs of stress of decrease in vigour. 2. Less than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 3. Greater than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 4. Plants are diseased or dying. • No increase in density or distribution of weeds

Closure Objective	Closure Options	Closure Criteria
		(Appendix 1) per plot compared to the adjacent native reference area(s). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate. Reference area(s) will be established within the adjacent native vegetation community to compare onsite and offsite vegetation conditions.
PM-4A		
At closure, the site will support early successional native vegetation characteristic of the surrounding adjacent native land use (Liard Range Mid-boreal boreal-subalpine Ecoregion of the Cordillera Ecological Region [Ecosystem Classification Group 2010] swamp wetland).	**Remove exposed section of pipe** -Timing: By end of March 2026 *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Exposed pipe has been removed and disposed. Remaining pipe to be abandoned in-place has been cut and capped at both ends.
	Waste Disposal All wastes generated during the Project are disposed of in a licensed facility as per Waste Management Plan. Materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, etc.). -Timing: By end of March 2026 *Applicable Closure Principles:* *(3) no long-term active care, and* *(4) future use*	• No wastes or construction materials at site.
	Return the landscape to contours compatible with adjacent native land uses, ensuring slope and soil stability is maintained. -Timing: By end of March 2026 and to be verified	• Contour/Grade and drainage re-establishment: o Surface contours match the surrounding landscape. o Un-natural ponding is not observed on- or up

Closure Objective	Closure Options	Closure Criteria
	through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	gradient from the site. • Microtopography: o No evidence of subsidence that is affecting drainage, vegetation establishment or is a physical hazard to humans or wildlife. o No evidence of rutting caused by construction that is altering drainage or vegetation establishment, resulting in bare ground. • Erosion: o No erosion beyond typical erosion observed in adjacent areas. o No visibly unstable slopes. o No sedimentation due to the Project. • Surface stoniness or debris: o Stoniness is rated on a scale from S0 to S5. There should be no S4 or S5 ratings, unless adjacent lands are similar (Appendix 1). o If present, CWD is at a density that is not restricting vegetation establishment from reaching 75% cover (or cover that is comparable to adjacent lands). o If present, mulch depth does not exceed 5 cm, unless there are no effects on vegetation establishment. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Soil is capable of supporting the desirable vegetation community. -Timing: By end of March 2026 and to be verified through the PCM program.	• No compaction causing vegetation to not meet vegetation closure criteria. • No admixing causing vegetation to not meet vegetation

Closure Objective	Closure Options	Closure Criteria
	Applicable Closure Principles: *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	closure criteria. • Topsoil depth should be within 60% of control location depth, unless no effects to vegetation establishment are observed. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Natural regeneration of Project footprint No seeding recommended for revegetation because no steep slopes, no observed weeds, and seed bank will be maintained. -Timing: By end of March 2026 and to be verified through the PCM program, which is plot based for vegetation. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• At least 3 ecologically suitable species growing onsite. • Less than 25% cover bare soil per plot. • Total surface water, desirable vegetation species cover (natural regeneration or seeded) and litter greater than 75% cover per plot. • Vegetation health (rated on a scale of 1 to 4) does not decrease by more than one rating from control locations(s): 1. Healthy with no signs of stress of decrease in vigour. 2. Less than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 3. Greater than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 4. Plants are diseased or dying. • No increase in density or distribution of weeds (Appendix 1) per plot compared to the adjacent native reference area(s). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate. Reference area(s) will be established within the adjacent

Closure Objective	Closure Options	Closure Criteria
		native vegetation community to compare onsite and offsite vegetation conditions.
Test Lead Posts		
At closure, the site(s) will support early successional native vegetation characteristic of the surrounding adjacent native land use.	**Remove the above-ground test lead posts, where feasible.** -Timing: By end of March 2026 *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Above ground test lead posts have been removed, where feasible, and disposed at an appropriate facility.
	Waste Disposal All wastes generated during the Project are disposed of in a licensed facility as per Waste Management Plan. Materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, etc.). -Timing: By end of March 2026 *Applicable Closure Principles:* *(3) no long-term active care, and* *(4) future use*	• No wastes or construction materials at site.
	Return the landscape to contours compatible with adjacent native land uses, ensuring slope and soil stability is maintained. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and*	• Contour/Grade and drainage re-establishment: o Surface contours match the surrounding landscape. o Un-natural ponding is not observed on- or up gradient from the site. • Microtopography: o No evidence of subsidence that is affecting drainage, vegetation establishment or is a physical hazard to humans or wildlife.

Closure Objective	Closure Options	Closure Criteria
	(4) future use	○ No evidence of rutting caused by construction that is altering drainage or vegetation establishment, resulting in bare ground. • Erosion: ○ No erosion beyond typical erosion observed in adjacent areas. ○ No visibly unstable slopes. ○ No sedimentation due to the Project. • Surface stoniness or debris: ○ Stoniness is rated on a scale from S0 to S5. There should be no S4 or S5 ratings, unless adjacent lands are similar (Appendix 1). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Soil is capable of supporting the desirable vegetation community. -Timing: By end of March 2026 and to be verified through the PCM program. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• No compaction causing vegetation to not meet vegetation closure criteria. • No admixing causing vegetation to not meet vegetation closure criteria. • Topsoil depth should be within 60% of control location depth, unless no effects to vegetation establishment are observed. Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate.
	Natural regeneration No seeding recommended for revegetation because no steep slopes, no observed weeds, and seed bank will be maintained. -Timing: By end of March 2026 and to be verified through the PCM program, which is plot based for	• At least 1 ecologically suitable species growing onsite. • Less than 25% cover bare soil per plot. • Total surface water, desirable vegetation species cover (natural regeneration or seeded) and litter greater than 75% cover per plot.

Closure Objective	Closure Options	Closure Criteria
	vegetation. *Applicable Closure Principles:* *(1) physical stability,* *(3) no long-term active care, and* *(4) future use*	• Vegetation health (rated on a scale of 1 to 4) does not decrease by more than one rating from control locations(s): 1. Healthy with no signs of stress of decrease in vigour. 2. Less than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 3. Greater than 25% of plants show signs of decreased health (changes in colour, or signs of stress or disease). 4. Plants are diseased or dying. • No increase in density or distribution of weeds (Appendix 1) per plot compared to the adjacent native reference area(s). Should any of these criteria not be met, mitigation and/or further monitoring will be recommended where appropriate. Reference area(s) will be established within the adjacent native vegetation community to compare onsite and offsite vegetation conditions.

In general, successful reclamation will be defined as achieving a final site condition that is similar to a representative area off the Project construction footprint. Representative areas will be identified by Westcoast in consultation with an Environmental Consultant.

5.2.4 Predicted Residual Effects

The assessment team completed a determination of significance for the predicted residual effects based on a qualitative evaluation of all assessment criteria for each residual effect, which is referred to as a qualitative aggregation method (Canadian Environmental Assessment Agency 2018a) (Jacobs 2022a). Qualitative significance determinations incorporate professional judgement, which allows for the integration of all effects criteria ratings to provide relevant significance conclusions that are sensitive to context and that facilitate decision-making (Lawrence 2007). The assessment team consisted of discipline experts, experienced assessment practitioners, and senior reviewers. Since physical abandonment activities are similar in nature to routine pipeline construction activities, the evaluation of significance benefited from review of select PCM reports from previous projects either completed in proximity to the Project, or where the Project encountered similar issues, for relevant residual effects (Jacobs 2022a).

The Project is not anticipated to result in significant environmental or socio-economic effects, nor result in any significant negative residual impact.

5.2.5 Uncertainties & Contingencies

The Project is a relatively small-scale abandonment project that includes reclamation. As a result, there are limited uncertainties and contingencies. Notable uncertainties and contingencies include:

- Forest fire season: A severe forest fire season may delay or prevent the Project from occurring. A severe fire season could impact the Project footprint or draw resources, such as construction equipment, needed for the Project.
- Water bans/drought: Continued drought conditions may prevent Westcoast from using water for ice/winter road construction. This could result in a delay to the Project. Low water may also prevent Westcoast from using barging to stage equipment.
- Natural regeneration: Natural regeneration is the preferred revegetation method for most locations of ground disturbance on the Project. Should the results of the PCM indicate that natural regeneration is not resulting in revegetation at a specific location, it will be seeded. Local or northern seed sources will be prioritized for reclamation.
- Slumping: If Westcoast determines that any slopes or banks leading to watercourses are unstable, the banks will be reshaped to prevent slumping. Once the banks are reshaped, temporary erosion control measures will be installed and inspected daily with any required repairs completed before the end of the day. Unstable soils and/or site-specific factors such as stream velocity and flow direction may require additional reclamation

efforts, such as installation of rock rip-rap, to stabilize disturbed stream bed/banks. Rock rip-rap will only be used where site-specific conditions require and where Westcoast has acquired applicable permits or approvals.

Under the CER Act and regulations, Westcoast remains responsible for pipelines abandoned in place. The CER requires pipeline companies to set aside funds for long-term monitoring and unforeseen events and requires pipeline companies to periodically monitor pipelines abandoned in place.

6.0 Progressive Reclamation

The Project is an abandonment and reclamation project and as such progressive reclamation is not applicable.

7.0 Temporary Closure

As this facility is no longer operating, there is no prospect for temporary closure.

8.0 Integrated Schedule of Activities

Mobilization will commence in Q3 2025 with abandonment activities occurring through the winter. Final reclamation will begin upon the completion of construction activity. No buildings, equipment, or waste will remain beyond the expiration date of the permits. Project activities are planned to generally follow the schedule outlined in the attached Gantt chart (Appendix 4).

9.0 Post-Closure Site Assessment

9.1 Follow up and Monitoring

Following completion of physical abandonment activities, Westcoast will conduct PCM for a period of 7 years to ascertain if vegetation regrowth is on an appropriate trajectory to successfully meet equivalent land capability, and implement correction measures as needed through adaptive management. Assessments are planned in years 1, 3, 5 and 7 of the 7-year program. Should the closure criteria not be met at year 7, further corrective actions will be required. Following year 7, if necessary, PCM will continue every 2 years, or as appropriate, to monitor the success of the corrective actions or remedial measures, until the closure criteria are met. Full assessment methodology will be provided in the PCM report, which will also act as the Performance Assessment Report to adhere to the Guideline for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB and AANDC 2013). The purpose of the reclamation monitoring phase of the Project is to:

- assess the effectiveness of environmental protection measures implemented during physical abandonment activities;

- review the success of re-establishing equivalent land capability at areas disturbed during physical abandonment activities; and
- document any corrective actions or opportunities for improvement on future projects.

Land reclamation success will be measured against adjacent site conditions (i.e., control locations) by assessing parameters and using the criteria outlined in Table 3. Following the first, third, fifth, and seventh full growing seasons after final clean-up, monitoring will include:

- inspecting areas disturbed using ground reconnaissance to capture previously unidentified environmental issues;
- evaluating the natural recovery of lands disturbed during physical abandonment activities;
- assessing the effectiveness of mitigation practices used during physical abandonment activities;
- evaluating the recovery of ecological function of wetlands disturbed during physical abandonment activities;
- recommending further remedial measures, if warranted, to be implemented to address outstanding environmental issues; and
- restoring disturbed areas to self-sustaining ecosystems that are compatible with adjacent native land uses.

In addition, long-term monitoring of the pipeline ROW is planned to account for the remote possibility of issues arising following completion of the PCM program. The PCM Plan may be developed as soon as the end of June 2026. The existing pipeline ROW that will be used for temporary access, and the existing trail that will be used for temporary access will be monitored via helicopter overflights following completion of physical abandonment activities as part of the PCM program. If potential issues are observed during overflights, the criteria for landscape, vegetation, and soil (as described in Table 5) will be used to assess those select locations during ground-based surveys. If no potential issues are observed during overflights, no ground-based assessment will be conducted.

Westcoast is committed to meeting CER and CSA Z662 Clause 10.6.1.1 requirements for post-abandonment monitoring and care, and requirements set out in Order ZO-003-2024 pursuant to subsection 241 (1) of the *CER Act* to Westcoast as authorization for the Project. Westcoast will conduct regular patrols to observe and address, at minimum, the following:

- Construction Activity
- Dredging Operations
- Erosion
- Evidence of Leaks

- Ice Effects
- Loss of Cover
- Scour
- Seismic Activity
- Soil Slides
- Subsidence
- Unauthorized Activities (UAs)

No wildlife monitoring is planned to occur post-closure. Should wildlife monitoring be a regulatory or stakeholder requirement, wildlife monitoring will be incorporated into the PCM Plan. Thresholds for determining when and what remedial activities will be required will be outlined in the PCM plan that will be developed after the completion of abandonment activities.

10.0 Financial Security

Westcoast will post and maintain a security deposit with the Minister of Indigenous and Northern Affairs Canada that provides direct, unencumbered access to the full amount and in a form that will retain its full value throughout the Project and throughout post-closure monitoring. Westcoast has an existing security deposit in the amount of $30,000 for its ROW license (095B04001).

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Appendix 1: Closure Criteria Categories

Surface Stoniness and Debris

- S0 (non-stony) – No stones or few stones are present with no interference with land use (stones are less than 0.01% of the surface, and greater than 25 m apart).
- S1 (slightly stony) – Stones comprise 0.01 to 0.1% of surface, are 8 to 25 m apart, and have little to slight potential for interference with land use.
- S2 (moderately stony) – Stones comprise 0.1 to 3% of surface, are 1 to 8 m apart, and have slight to moderate potential for interference with land use.
- S3 (very stony) – Stones comprise 3 to 15% of surface, are 0.5 to 1 m apart, and have moderate to high potential for interference with land use.
- S4 (exceedingly stony) – Stones comprise 15 to 50% of surface, are 0.1-0.5 m apart, and have high potential for interference with land use and require clearing prior to any cultivation.
- S5 (excessively stony) – Stones greater than 50% of surface and are less than 0.1 m apart. Stones prevent any cultivation and are often in the form of boulder or stone pavement.

Source: Government of Canada. n.d. "Surface Stoniness Class." *National Soil Database.* Agriculture and Agri-Food Canada. Last Modified: June 25, 2013. Accessed [day] March 2025. https://sis.agr.gc.ca/cansis/nsdb/dss/v3/cmp/stoniness.html.

**surface stones or debris can often be beneficial to reclamation in forested regions, creating microsites or aiding in stability. Can be a concern if density of stones or debris (e.g., coarse woody debris) is too high, restricting vegetation establishment.

Weed Distribution Classes

Code	Rating	Description of Abundance in Polygon	Distribution
0	N/A	None	
1	Low	Rare	
2		A few sporadically occurring individual plants	
3		A single patch	
4		A single patch plus a few sporadically occurring plants	
5	Moderate	Several sporadically occurring plants	
6		A single patch plus several sporadically occurring plants	
7		A few patches	
8		A few patches plus several sporadically occurring plants	
9		Several well-spaced patches	
10	High	Continuous uniform occurrences of well-spaced plants	
11		Continuous occurrence of plants with a few gaps in the distribution	
12		Continuous dense occurrence of plants	
13		Continuous occurrence of plants with a distinct linear edge in the polygon	

Source: Adapted from Adams, B.W., G. Ehlert, C. Stone, M. Alexander, D. Lawrence, M. Willoughby, D. Moisey, C. Hincz, A. Burkinshaw, J. Richman, K. France, C. DeMaere, T. Kupsch, T. France, T. Broadbent, L. Blonski, A. Miller. 2016. *Rangeland Health Assessment for Grassland, Forest and Tame Pasture*. Alberta Environment and Parks, Rangeland Resource Stewardship Section. pp. 156.

Weed Density Classes

Density Code	Definition
1	< 1 plant/m^2
2	2-5 plants/m^2
3	6-10 plants/m^2
4	> 10 plants/m^2

Source: British Columbia Ministry of Forests and Range (BC MFR). 2010. *Invasive Alien Plant Program Reference Guide*. 77 pp.

Notes:

> = greater than

< = less than

m2 = square metre(s)

Appendix 2: Phase I ESA

Jacobs

Pointed Mountain Pipeline Abandonment Project

Phase I Environmental Site Assessment

Final

February 2022

Westcoast Energy Inc.

Jacobs

Phase I Environmental Site Assessment

Pointed Mountain Pipeline Abandonment Project

Project No:	CE810600
Document Title:	Phase I Environmental Site Assessment
Document No.:	FES0924211023CGY
Revision:	Final
Date:	February 2022
Client Name:	Westcoast Energy Inc.
Project Manager:	Patrick Kalita, P.Chem.
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Acronyms and Abbreviations

~	approximately
Amoco	Amoco Resources Limited
APEC	area of potential environmental concern
BC	British Columbia
BC OGC	British Columbia Oil and Gas Commission
BTEX	benzene, toluene, ethylbenzene, and xylenes
CER	Canada Energy Regulator
COPC	contaminant of potential concern
CSA	Canadian Standards Association
ERIS	Environmental Risk Information Services
ESA	environmental site assessment
F	fraction(s)
FCSI	Federal Contaminated Sites Inventory
GIN	Groundwater Information Network
HEPH	heavy extractable petroleum hydrocarbon
iMapBC	British Columbia Government Public Geographic Information System Mapping Tool
ID	identifier
km	kilometre(s)
KP	Kilometre Post
L	litre(s)
LEPH	light extractable petroleum hydrocarbon
LTSA	Land Title and Survey Authority
m	metre(s)
masl	metre(s) above sea level
MBC	mix-bury cover
MGP	Mackenzie Gas Project
N/A	not applicable
No.	number
NPS	nominal pipe size
NRM	NorthRiver Midstream Inc.
NWT	Northwest Territories
OROGO	Office of the Regulator of Oil and Gas Operations
PAH	polycyclic aromatic hydrocarbon

Phase I Environmental Site Assessment

Paramount	Paramount Resources Limited
PHC	petroleum hydrocarbon
PO	pump-off
Triton	Triton Environmental Consultants
UBC	University of British Columbia
VPH	Volatile petroleum hydrocarbon
Westcoast	Westcoast Energy Inc.
Yukon	Yukon Territory

1. Introduction and Scope

Jacobs Consultancy Canada Inc. (Jacobs) completed this Phase I Environmental Site Assessment (ESA) to support Westcoast Energy Inc. (Westcoast) in the abandonment of the Pointed Mountain Pipeline (Nominal Pipe Size [NPS] 20). The pipeline traverses through the Northwest Territories (NWT), Yukon Territory (Yukon), and British Columbia (BC) (Figure 1.1-1).

This Phase I ESA focuses on the Pointed Mountain Pipeline areas of aboveground infrastructure, PM-1 to PM-4 and PM-6 to PM-10 (the Sites), and the pipeline right-of-way immediately adjacent to the Sites (Figure 1.1-1), to identify areas of potential environmental concern (APECs) at which contaminants of potential concern (COPCs) may have been released into the surrounding environment as a result of historical operations. It is Jacobs' understanding that the below grade pipeline will be abandoned in-place, while aboveground infrastructure will be demolished and removed.

The assessment was completed in general accordance with the guidance document provided by the Canadian Standards Association (CSA) Standard Z768-01 (R2016), Phase I ESA (CSA 2016).

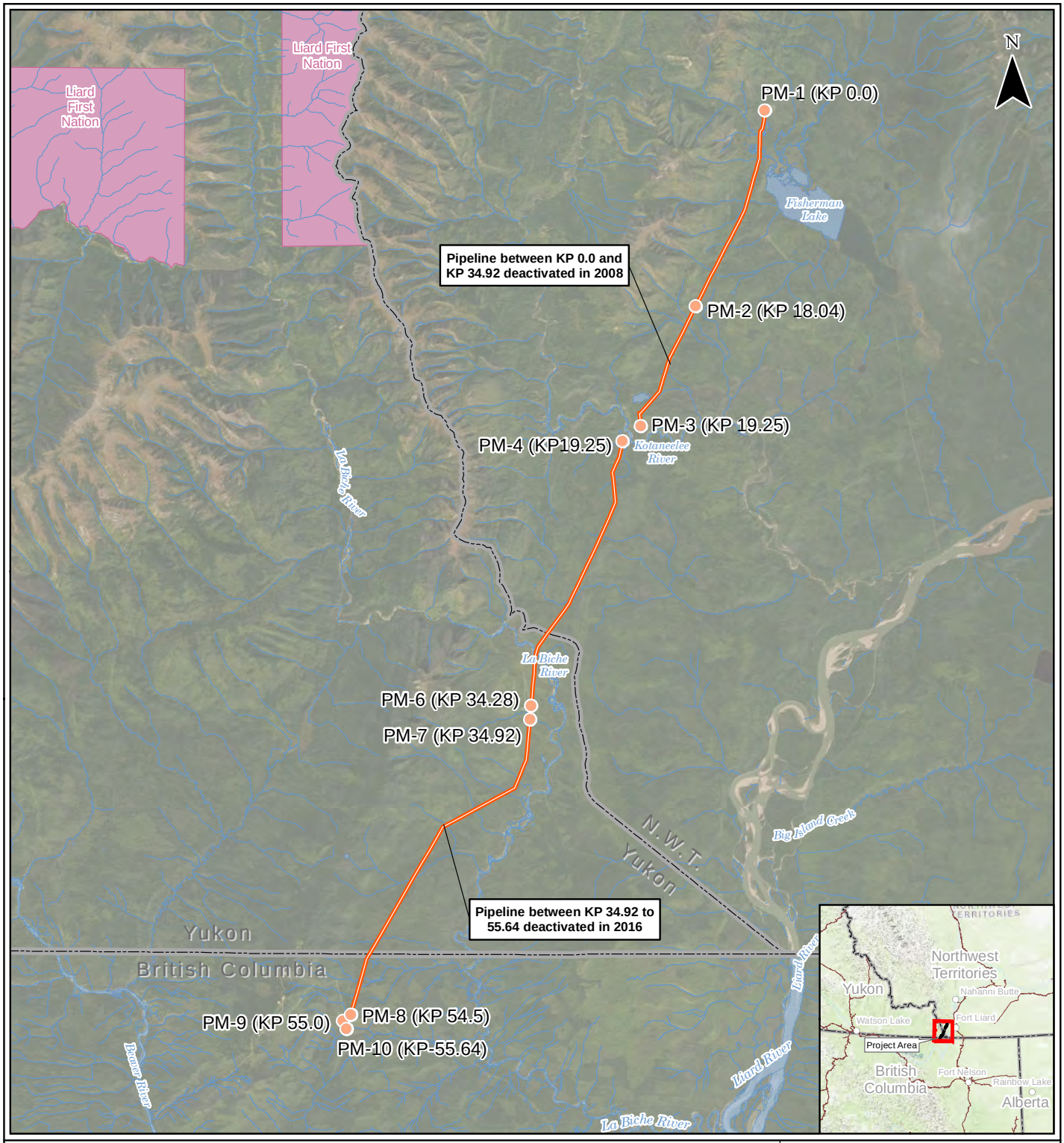
1.1 Scope of Work

The associated principles and general practices followed by Jacobs are consistent with the guidance provided by:

- CSA Standard Z768-01 (R2016).
- 2016 British Columbia Ministry of Environment Strategy Technical Guidance 10 on Contaminated Sites – Guidance for a Stage 1 Preliminary Site Investigation (BC MOE 2016).
- Protocol for the *Contaminated Sites Regulation* under the *Environment Act* (Government of Yukon 2020).
- Government of the Northwest Territories' Approach to Contaminated Sites Management (Government of the NWT 2019).

There are four key components of this Phase I ESA:

1) Desktop review of available environmental records and databases, including:
   - current and historical land titles
   - geographic land information reports
   - Westcoast files
   - records of current and historical tanks and tank farms
   - Environmental Risk Information Services (ERIS)
   - records of spills, leaks, or contaminated sites
   - Federal Contaminated Sites Inventory (FCSI)
   - oil and gas infrastructure, water wells, and spills and complaints
   - surficial and bedrock geology
   - historical aerial photographs
2) Interviews:
   - Interviews with pipeline operators with historical knowledge of the Sites and surrounding land uses were conducted on August 10, 2020
3) Site Inspection:
   - A visual walkthrough of each Site belonging to Westcoast was conducted from August 17 to August 20, 2021 to identify APECs
4) Report:
   - An outline and discussion of the findings from Tasks 1, 2, and 3
   - Identify issues of environmental concern
   - Conclusions and recommendations for further investigation, if necessary



Site Location
Pointed Mountain Pipeline Route
Provincial Boundary
Watercourse
Water Body
First Nations (Interim Protected Lands)

FIGURE 1.1-1

PROJECT OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

SCALE: 1:275,000
0 2.5 5
Kilometres
(All Locations Approximate)

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

November 2021

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2. Pipeline Description

2.1 Pointed Mountain Pipeline

The Pointed Mountain Pipeline, constructed in the early 1970s, is approximately 56 kilometres (km) in length, with the northernmost 31 km in the NWT, a central segment of 20 km in Yukon, and the southernmost 5 km in BC. The pipeline has been deactivated (i.e., purged, cleaned of residual products, internally coated with corrosion inhibitor, and physically isolated from sources of upstream pressure) for several years (Kilometre Post [KP] 0.0 to KP 34.92 in 2008 and KP 34.92 to KP 55.64 in 2016), has been filled with nitrogen and connected to an active cathodic protection system to prevent corrosion (Westcoast 2020).

The buried pipeline has aboveground components which include pigging stations, pipe risers, and pump shacks (Table 2.1-1). A key component of decommissioning the Pointed Mountain Pipeline will be removing these aboveground portions of the pipeline. Note that NorthRiver Midstream Inc. (NRM) also owns and operates infrastructure at many of the aboveground infrastructure locations. This infrastructure is not included in Table 2.1-1.

Table 2.1-1. Summary of Aboveground Infrastructure Locations

Site ID	KP	Province/ Territory	Location	Remaining Aboveground Infrastructure[a]
PM-1 (Pointed Mountain Launcher)	0.0	NWT	60.396836°, -123.826339°	1. NPS 24 pig launcher and catch basin 2. Pipe supports (ten) 3. NPS 20 S-bend riser 4. NPS 6 flare riser 5. Flare stack control panel 6. Aboveground diesel tanks (two), tubing, and support frames 7. Aboveground propane tanks (four) 8. NPS 4 aboveground flare piping, kicker piping, and associated valves and actuators 9. NPS 20 aboveground piping and associated valves and actuators 10. Building, platform, and stairs 11. Cathodic protection 12. NPS 20 risers/elbows and check valves on the piping to the producer plant (two) 13. Nitrogen vent and valve on Pointed Mountain Pipeline
PM-2 (Producer tie-in)	11.1	NWT	60.305046°, -123.893334°	1. NPS 4 producer tap, piping, and valves (three)
PM-3 (Nitrogen vent)	18.04	NWT	60.249004°, -123.944666°	2. NPS 2 nitrogen vent and valves
PM-4 (Nitrogen vent)	19.25	NWT	60.241866°, -123.961820°	3. NPS 2 nitrogen vent and valve

Phase I Environmental Site Assessment

Table 2.1-1. Summary of Aboveground Infrastructure Locations

Site ID	KP	Province/ Territory	Location	Remaining Aboveground Infrastructure[a]
PM-6 (Producer tie-in)	34.28	Yukon	60.111627°, -124.049316°	1. NPS 2 hot tap riser from deactivated Pointed Mountain Pipeline 2. NPS 6 hot tap riser from deactivated Pointed Mountain Pipeline 3. Pipe supports (four) 4. NPS 6 S-bend riser 5. NPS 6 aboveground piping and valves from Pointed Mountain Pipeline to bypass 6. NPS 2 aboveground piping and valves from Pointed Mountain Pipeline to bypass 7. Corrugated metal pipes (two) 8. NPS 6 aboveground piping and valves at meter building (building owned by Paramount) 9. NPS 2 aboveground piping and valves at meter building (building owned by Paramount)
PM-7 (Current Launcher)	34.92	Yukon		1. NPS 2 nitrogen vent and valves (two) 2. NPS 20 S-bend riser 3. NPS 24 pig launcher 4. Stairs and platform 5. NPS 20 aboveground piping, valves, and actuators 6. NPS 20 aboveground mainline block valve stem 7. NPS 6 mainline valve blow-off piping and pipe supports (two) 8. NPS 6 aboveground flare piping, kicker piping, and associated valves and actuators 9. NPS 6 S-bend riser 10. NPS 6 aboveground bypass piping and valves from producer to launcher and flare 11. NPS 6 flare riser and support posts 12. Flare stack control panel support 13. Pipe supports (14) 14. Building 15. Support structure and stairs for building and diesel tank 16. Aboveground diesel tank and tubing 17. Aboveground propane tank (four) 18. Exterior electrical control structure 19. Cathodic protection
PM-8 (Aboveground riser)	54.5	BC	59.973255, -124.217414	1. NPS 20 aboveground pipe elbow and support
PM-9 (Aboveground riser)	55.0	BC	59.969810, -124.224830	1. NPS 20 aboveground pipe elbow 2. Concrete pipe supports (four)

Table 2.1-1. Summary of Aboveground Infrastructure Locations

Site ID	KP	Province/ Territory	Location	Remaining Aboveground Infrastructure[a]
PM-10 (Receiver)	55.64	BC	59.966308, -124.221247	1. NPS 20 S-bend riser 2. NPS 24 pig receiver 3. Launcher stairs and platform 4. Pipe support (three) 5. NPS 20 aboveground crossover piping, valves, and actuators 6. NPS 24 aboveground flare piping, receiver line piping, kicker piping, and associated valves and actuators

[a] Information on aboveground infrastructure provided by Westcoast (Westcoast 2020)

ID = identifier
Paramount = Paramount Resources Ltd.

Figures 2.2-1 through 2.2-9 present an aerial overview of each location of aboveground infrastructure (i.e., the Sites), outlining the locations of various historical activities that may present environmental concerns.

2.2 Historic Site Activities

Westcoast provided Jacobs with a summary of historic activities at each Site, summarized in Table 2.2-1

Table 2.2-1. Summary of Historic Activities at the Aboveground Infrastructure Locations

Site ID	Historic Activities[a]
PM-1	▪ Original launching barrel had two producer connections; one to a NPS 20 producer plant which was abandoned and removed, and one to a second producer receiving barrel (NPS 14) which remains. ▪ Pointed Mountain Pipeline was disconnected from the launching barrel in 2008 and deactivated. ▪ Launcher is isolated from the Pointed Mountain Pipeline and producer plant by removed piping, and isolated from the second producer receiver connection with a blind paddle flange. ▪ A flare line from NPS 14 producer receiver has been disconnected and piping was removed.
PM-2	▪ Pipeline tap, piping, and valve historically connected to a third-party producer pipeline which has been disconnected. Valve, piping, and tap remain.
PM-3	▪ Section of exposed pipe at the Kotaneelee River was removed in 2016 (between PM-3 and PM-4). Nitrogen riser remains at PM-3 to maintain nitrogen pressure in pipeline between PM-1 and PM-3.
PM-4	▪ Section of exposed pipe at the Kotaneelee River was removed in 2016 (between PM-3 and PM-4). Nitrogen riser remains at PM-4 to maintain nitrogen pressure in pipeline between PM-4 and PM-7.

Phase I Environmental Site Assessment

Table 2.2-1. Summary of Historic Activities at the Aboveground Infrastructure Locations

Site ID	Historic Activities[a]
PM-6	▪ Two pipelines run from a producer meter building to the Pointed Mountain Pipeline. ▪ Pointed Mountain Pipeline was deactivated in 2008 between PM-1 and PM-7. An additional 0.7 km NPS 6 bypass line was built to connect the new sending barrel at PM-7 to the two producer pipelines. ▪ Two producer pipelines (Paramount) are isolated at the meter building and Pointed Mountain Pipeline with spectacle blinds.
PM-7	▪ New barrel installed in 2008 after the original launching barrel at PM-1 was disconnected. ▪ Pointed Mountain Pipeline between PM-7 and PM-10 was deactivated and purged with nitrogen in March 2016. ▪ Launching barrel is isolated from the Pointed Mountain Pipeline and the producer lines with blind paddle flanges.
PM-8	▪ Location of historic receiving barrel and flare. Has since been abandoned and the equipment was relocated downstream.
PM-9	▪ Location of historic receiving barrel. Equipment has since been relocated downstream and the site has been abandoned.
PM-10	▪ Location of receiving barrel for the Pointed Mountain Pipeline and the launching barrel for the Beaver River pipeline (sold to NRM). ▪ Launching barrel is isolated from the Pointed Mountain Pipeline and NRM flare site with spectacle and paddle blind flanges. ▪ Isolation on the crossover and kicker piping between the Pointed Mountain Pipeline receiving barrel and former Beaver River (NRM) launching barrel provided by valves.

[a] Westcoast 2020

Underground Pipeline
Above Ground Pipeline
Above Ground Power
Underground Power
Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-1

PM-1 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: ; Roads: NRCan 2014-2015; Railway: NRCan 2012.

SCALE: 1:2,500
0 50 100
Metres
(All Locations Approximate)

Jacobs

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Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-2

PM-2 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE
ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

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Metres
(All Locations Approximate)

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Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-3

PM-3 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE
ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

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Metres
(All Locations Approximate)

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Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-4

PM-4 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE
ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

SCALE: 1:750
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Metres
(All Locations Approximate)

Jacobs

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Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-5

PM-6 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

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Metres
(All Locations Approximate)

Jacobs

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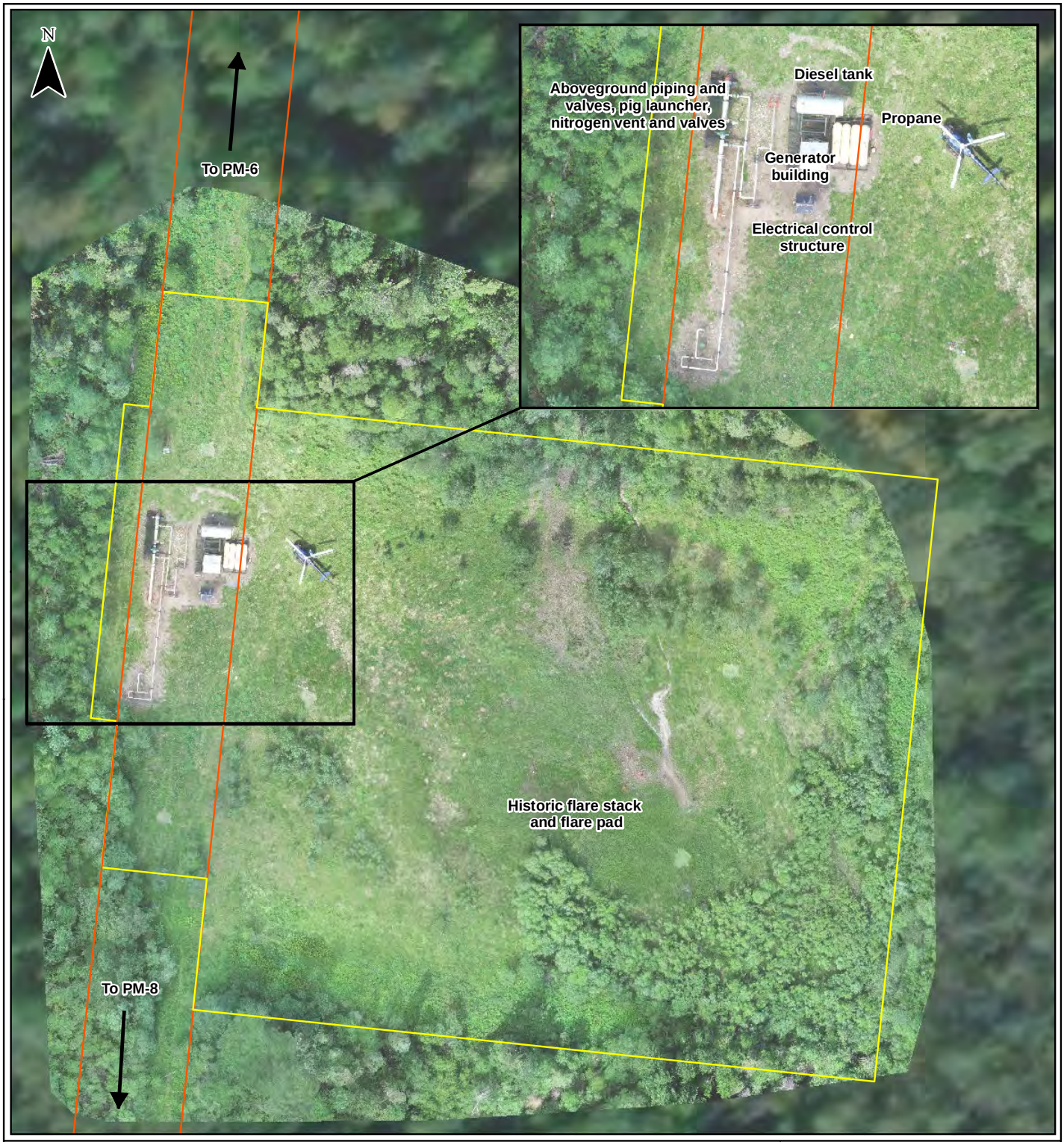

Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-6

PM-7 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

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Metres
(All Locations Approximate)

Jacobs

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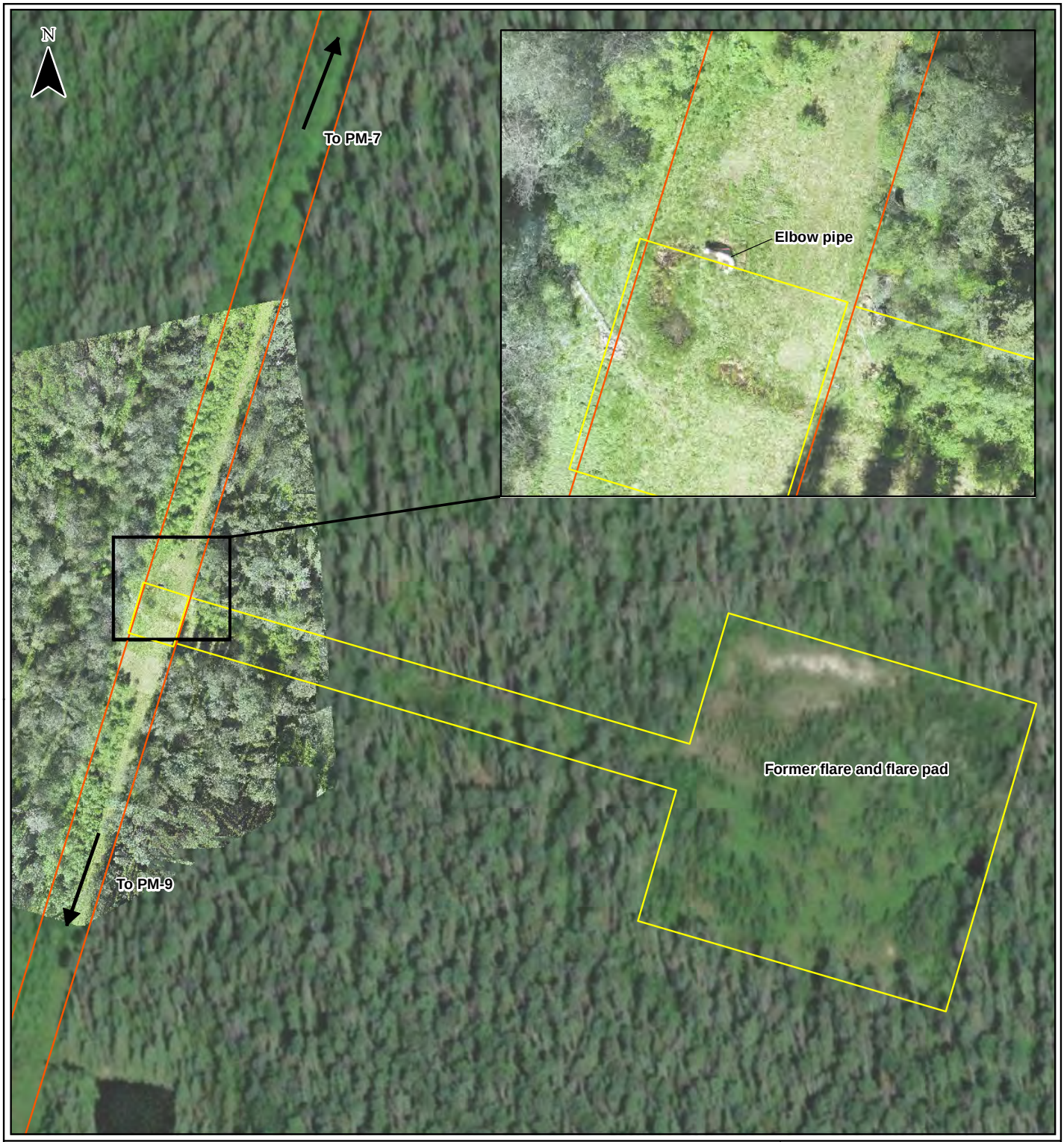

Westcoast Pipeline Right-of-Way
Westcost Site Boundary

FIGURE 2.2-7

PM-8 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE
ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

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(All Locations Approximate)

Jacobs

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Above Ground Pipeline
Underground Pipeline
Above Ground Communications
Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-8

PM-9 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE
ABANDONMENT PROJECT

ENBRIDGE

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

SCALE: 1:500
0 5 10
Metres
(All Locations Approximate)

Jacobs

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

November 2021

CE810600

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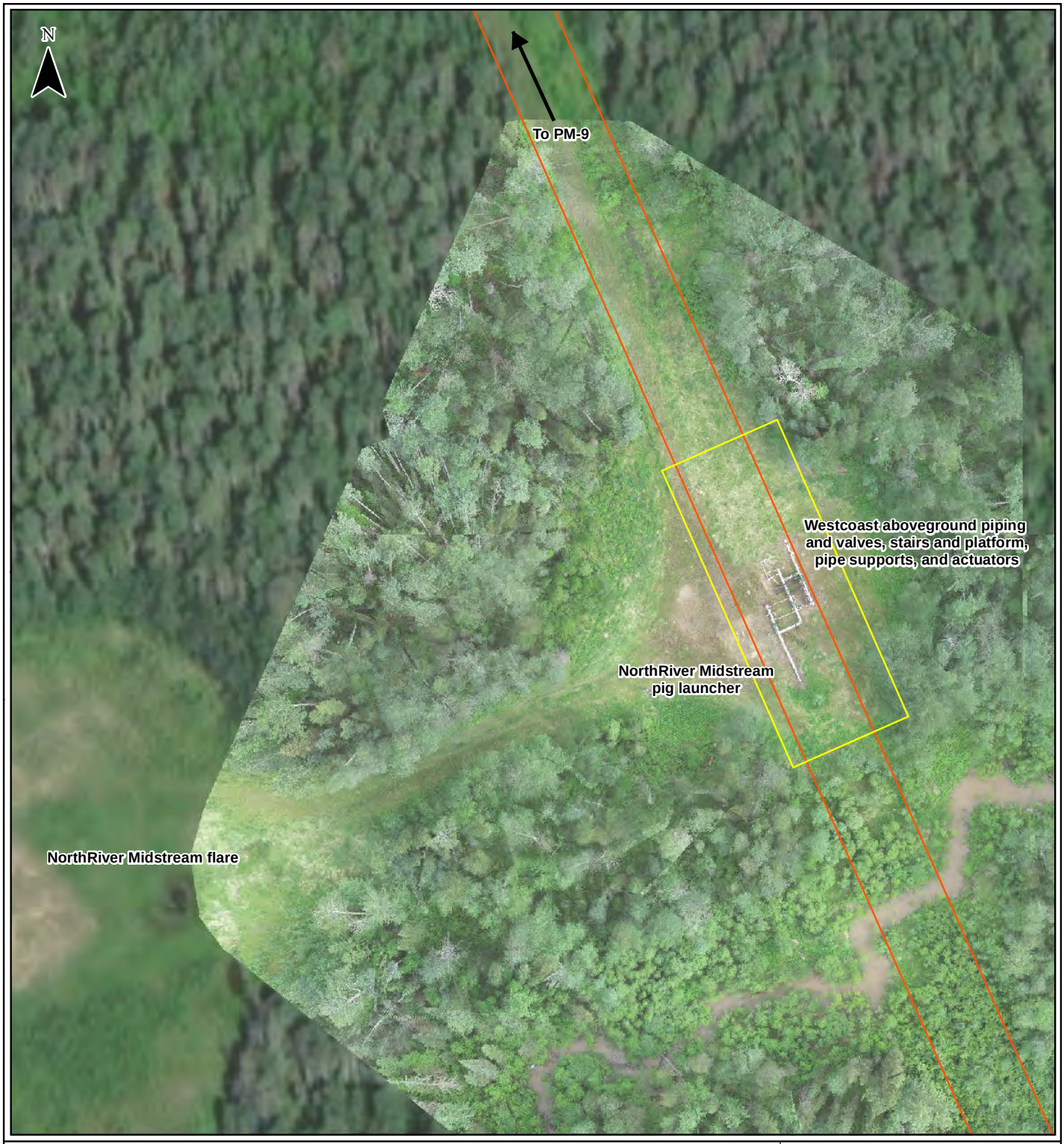

Westcoast Pipeline Right-of-Way
Westcoast Site Boundary

FIGURE 2.2-9

PM-10 SITE OVERVIEW
PHASE I ENVIRONMENTAL SITE ASSESSMENT

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

NAD 1983 UTM Zone 10N
Satellite Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

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Metres
(All Locations Approximate)

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

November 2021

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2.3 Land Use

Table 2.3-1 summarizes land use in the vicinity of the Sites.

Table 2.3-1. Summary of Land Use

Site ID	Property Land Use	Neighbouring Land Use
PM-1	Industrial (pipeline right-of-way, cleared access to flare pit)	North: cleared pipeline right-of-way, decommissioned Amoco plant site West: Paramount infrastructure immediately west, followed by natural forested land South: cleared pipeline right-of-way and natural forested land East: natural forested land
PM-2	Industrial (pipeline right-of-way)	North: natural forested land, forestry road runs parallel to pipeline right-of-way West: natural forested land, forestry road runs parallel to pipeline right-of-way South: natural forested land East: natural forested land
PM-3	Industrial (pipeline right-of-way)	North: cleared pipeline right-of-way and natural forested land West: natural forested land South: cleared pipeline right-of-way and natural forested land East: natural forested land
PM-4	Industrial (pipeline right-of-way)	North: cleared pipeline right-of-way and natural forested land West: natural forested land South: cleared pipeline right-of-way and natural forested land East: Natural forested land
PM-6	Industrial (pipeline right-of-way, grass airstrip)	North: grass airstrip, cleared pipeline right-of-way West: access road to adjacent Kotaneelee Gas Plant, natural forested land South: grass airstrip, cleared pipeline right-of-way East: grass airstrip, natural forested land
PM-7	Industrial (pipeline right-of-way, historic flare pad)	North: cleared pipeline right-of-way and natural forested land West: natural forested land South: cleared pipeline right-of-way and natural forested land East: natural forested land
PM-8	Industrial (pipeline right-of-way)	North: cleared pipeline right-of-way and natural forested land West: natural forested land South: cleared pipeline right-of-way and natural forested land East: natural forested land
PM-9	Industrial (pipeline right-of-way)	North: access road, cleared land (decommissioned Amoco Beaver River Gas Plant) West: natural forested land South: cleared pipeline right-of-way and natural forested land East: cleared pipeline right-of-way, natural forested land, access road
PM-10	Industrial (pipeline right-of-way)	North: cleared pipeline right-of-way and natural forested land West: clearing for flare pit (operated by NRM), natural forested land South: natural forested land East: natural forested land

Notes:
Amoco = Amoco Resources Limited
Paramount = Paramount Resources Limited

2.4 Topography

Site topography is summarized in Table 2.4-1.

Table 2.4-1. Topographic Summary

Site ID	Elevation (masl)	Topography Description	Reference
PM-1	~ 400	Generally flat, elevation decrease toward south southwest	Government of the NWT 2021
PM-2	~ 470	Generally flat, elevation decrease toward southeast	Government of the NWT 2021
PM-3	~ 310	Generally flat, elevation decrease toward south, southeast, and southwest	Government of the NWT 2021
PM-4	~ 365	Generally flat, elevation decrease toward north-northeast	Government of the NWT 2021
PM-6	~ 365	Generally flat, slight elevation decrease toward east	Government of Yukon 2021a
PM-7	~ 370	Generally flat, slight elevation decrease toward east	Government of Yukon 2021a
PM-8	~420	Generally flat, slight elevation decrease toward east	Government of BC 2021
PM-9	~420	Generally flat, slight elevation decrease toward east	Government of BC 2021
PM-10	~420	Generally flat, slight elevation decrease toward east	Government of BC 2021

Notes:

~ = approximately
masl = metre(s) above sea level

2.5 Geology

Bedrock and surficial geology were reviewed for each area containing aboveground infrastructure. Bedrock geology is summarized in Table 2.5-1.

Table 2.5-1. Summary of Bedrock Geology

Site ID	Formation	Description	Reference
PM-1, PM-2	Undivided Shale of Fort St. John Group	Lower Cretaceous dark grey shale with some interbedded fine-grained sandstone. Several thrust faults exist in the broader area, and seismic activity is known to occur.	Fallas and Lane 2001
PM-3, PM-4, PM-6, PM-7,	Lepine Formation of the Fort St. John Group	Cretaceous sideritic mudstone and shale	Government of Yukon 2021a
PM-8, PM-9, PM-10	Sikanni Formation of the Fort St. John Group	Cretaceous fine-grained, grey sandstone, siltstone, and shale	Government of BC 2021

Surficial geology is summarized in Table 2.5-2.

Table 2.5-2. Summary of Surficial Geology

Site ID	Description	Reference
PM-1	Quaternary glacial till blankets composed of sand to clay sediments with striated clasts of various lithologies, may include localized flutes or drumlins	Bednarski 2002
PM-2	Quaternary colluvial deposits composed of poorly sorted sediments with some rubble-covered bedrock surfaces	Bednarski 2002
PM-3, PM-4	Quaternary glaciolacustrine sediments composed of silt and clay, locally containing stones	Geological Survey of Canada 2020
PM-6	Quaternary valley wall terrace deposits composed of well-sorted sand and gravel with organic debris, including logs	Smith 2002
PM-7	Quaternary alluvial fan deposits composed of poorly sorted gravel and sand with organic debris and buried soils	Smith 2002
PM-8, PM-9, PM-10	Quaternary glacial till blankets composed of sand to clay sediments with striated clasts of various lithologies	Geological Survey of Canada 2020

2.6 Soils

Available soil data were reviewed for each Site and are summarized in Table 2.6-1.

Table 2.6-1. Summary of Soil Data

Site ID	Description	Reference
PM-1	Poorly drained Typic Mesisols (Trail River soil unit) associated with wetland land uses. Cyric and Hydric Fibrisols also occur.	Government of Canada 1975
PM-2, PM-3	Orthic Gray Luvisols (Celibeta soil unit) developed over fine-textured lacustrine materials. Brunisolic Gray Luvisol, Gleyed Orthic Brunisol also occur.	Government of Canada 1975
PM-4	Orthic Gray Luvisols (Trout Lake and Pointed Mountain soil units) developed over fine-textured lacustrine materials and till deposits.	Government of Canada 1975
PM-6, PM-7	There are no detailed soil surveys available for the portion of the Project area in southeastern Yukon. The Project is located in the Muskwa Plateau Ecoregion. Soils in the Muskwa Plateau Ecoregion primarily consist of Brunisolic Gray Luvisols developed over fine-textured morainal or glaciolacustrine deposits. Well-drained Eutric Brunisols over coarse-textured parent materials also occur, while imperfectly to poorly drained Orthic and Humic Gleysols are common in depressions and low laying areas. Wetlands are occupied by Organic Cryosols, Fibrisols, or Mesisols	Smith et al. 2004 Soil Classification Working Group 1998

Table 2.6-1. Summary of Soil Data

Site ID	Description	Reference
PM-8, PM-9, PM-10	There are no detailed soil surveys available for the portion of the Project area in northern BC. Soils in this region are dominated by Luvisols, consistent with available data coverage for the Yukon and NWT. Poorly drained Gleysolic soils and organic soils associated with low laying areas and wetlands are also present.	Government of Canada 2020

2.7 Hydrology and Hydrogeology

The Pointed Mountain Pipeline is located within the Mackenzie River Basin and the southern half of the Liard River transboundary sub-basin. The Mackenzie River Basin drains northward into the Arctic Ocean carrying waters from five provinces and territories (Alberta NWT 2017).

The Sites are located within the southern half of the Liard River sub-basin (within the Central Liard [La Biche] river sub-basin), where permeable layers are extensive, slopes are gentle, and permafrost is sporadic. The Central Liard sub-basin has 15 percent aquifer potential. Very little is documented about the current groundwater quality in this area (Palmer 2020). Table 2.7-1 presents a summary of substrate permeability, aquifer potential, and vulnerability to groundwater overuse and contamination at each Site.

Table 2.7-1. Summary of Substrate Permeability and Aquifer Characteristics Proximal to the Sites

Site ID	Substrate Permeability	Rock and Sediment Type Related to Permeability	Aquifer Potential	Vulnerability to Overuse	Vulnerability to Contamination	Reference
PM-1	Highly permeable	Surficial glaciofluvial, fluvial deposits	High potential for shallow aquifers connected to modern day watercourses	Moderate	Moderate	Palmer 2020
PM-2	Low permeability	Lower permeability sedimentary bedrock; lacustrine or glaciolacustrine sediment and sub-glacial till	Minimal aquifer potential	N/A	N/A	Palmer 2020
PM-3, PM-4, PM-6, PM-7	Highly Permeable	Surficial glaciofluvial, fluvial deposits	High potential for shallow aquifers connected to modern day watercourses	Moderate	Moderate	Palmer 2020

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Table 2.7-1. Summary of Substrate Permeability and Aquifer Characteristics Proximal to the Sites

Site ID	Substrate Permeability	Rock and Sediment Type Related to Permeability	Aquifer Potential	Vulnerability to Overuse	Vulnerability to Contamination	Reference
PM-8, PM-9, PM-10	Low-Moderate Permeability	Lower permeability sedimentary bedrock; lacustrine or glaciolacustrine sediment and sub-glacial till	Low aquifer potential	Low-Moderate	Low-Moderate	Holding & Allen 2016

N/A = not applicable

2.7.1 Surface Waterbodies

Jacobs reviewed the available information from the Government of the NWT Geospatial Database, Yukon's GeoYukon database (GeoYukon), and the Government of BC's iMapBC database (iMapBC) to identify mapped wetlands and waterbodies near each area of aboveground infrastructure. Wetlands in the NWT and Yukon were not extensively mapped; therefore, some sites may be closer to waterbodies not found in the search.

Table 2.7-2. Summary of Surface Waterbodies Proximal to Aboveground Infrastructure

Site ID	Waterbody Type	Distance to Nearest Waterbody from Site Boundary[a]	Reference
PM-1	Unnamed waterbody	~385 m south	Government of the NWT 2021
PM-2	Unnamed waterbody	~2.0 km northeast	Government of the NWT 2021
PM-3	Kotaneelee River	~530 m southwest	Government of the NWT 2021
PM-4	Kotaneelee River Unnamed waterbody	~380 m northeast ~270 m northwest	Government of the NWT 2021
PM-6	Unnamed tributary of the La Biche River Unnamed waterbodies adjacent to the La Biche River La Biche River	~405 m southwest ~690 m northeast ~1.0 km east	Government of Yukon 2021a
PM-7	Unnamed tributary of the La Biche River Unnamed waterbodies adjacent to the La Biche River La Biche River	~465 m northwest ~865 m east ~1.0 km west of northeast	Government of Yukon 2021a
PM-8	Wetland	~890 m southeast	Government of BC 2020

Table 2.7-2. Summary of Surface Waterbodies Proximal to Aboveground Infrastructure

Site ID	Waterbody Type	Distance to Nearest Waterbody from Site Boundary[a]	Reference
PM-9	Wetland	~820 m southeast	Government of BC 2020
PM-10	Wetland	~480 m east	Government of BC 2020

Notes:

[a] Distances are approximate and were measured through the Government of the NWT Spatial Database, GeoYukon, and iMapBC mapping tools

m= metre(s)

3. Historical Data Review

Jacobs conducted a literature search for available historical information for each Site. As the Pointed Mountain Pipeline is located in the NWT, Yukon, and BC, multiple databases were utilized for the historic data review. The information identified and databases searched are summarized in subsections 3.1 through 3.12.

3.1 Environmental Risk Information Services

ERIS is the leading source of information pertaining to environmental risks posed by either current or historical activities at properties. As part of its comprehensive reporting, ERIS searches federal, provincial, territorial, and private data sources, listed in the report provided in Appendix A.

An ERIS report was generated on June 1, 2020 for the entire length of the Pointed Mountain Pipeline. The search included the pipeline right-of-way, the areas of aboveground infrastructure, and a 300-m buffer on either side of the right-of-way. The ERIS report identified no records for the Pointed Mountain Pipeline (ERIS 2020). As the Pointed Mountain Pipeline has been deactivated and is located in a remote location, the ERIS report from 2020 is considered to be applicable to current conditions.

Appendix A provides a copy of the full report, including a list of the databases searched and a map of the area searched.

3.2 Land Titles

Jacobs submitted a title request to the NWT Lands Office for the PM-1, PM-2, PM-3, and PM-4 Sites on September 20, 2021. Current or historic land titles were not available. However, field survey plans documenting the pipeline easement were provided for each Site location and are presented in Appendices B.1 through E.1.

Jacobs submitted a title request to the Yukon's Land Title Office for PM-6 and PM-7. A response was received on September 21, 2021 and indicated that the land was untitled and unsurveyed. The Land Title Office provided a survey which includes a portion of the Pointed Mountain Pipeline near the La Biche River; however, the PM-6 and PM-7 Sites are not shown. Jacobs' personnel contacted the NWT Lands Branch by telephone on September 23, 2021 who confirmed that the land was untitled and unsurveyed. A copy of the correspondence and the survey plan is provided in Appendices F.1 and G.1.

Jacobs completed a search of the BC Land Title and Survey Authority (LTSA) on September 21, 2021 for PM-8, PM-9, and PM-10. As no parcel identifiers could be located for the infrastructure locations, current or historic land titles were not available for review.

3.3 Aerial Photographs

Jacobs reviewed aerial photographs from the Earth Observation Data Management System provided by Natural Resources Canada (NRCan 2021) and the University of British Columbia (UBC) Geographic Information Centre (UBC 2021a).

Aerial photograph review was limited to those photographs showing the aboveground infrastructure locations and surrounding areas. Aerial Photographs were selected to encompass the aboveground infrastructure associated with the pipeline and the adjacent properties, at scales suitable for the land use interpretation.

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Table 3.3-1 presents a brief discussion on the noted observations regarding development of the Sites. Aerial photographs for each Site are included in Appendices B.2 through G.2 and H.1 through J.1.

Table 3.3-1. Aerial Photograph Observations

Site ID	Appendix	Photograph Date	Observations
PM-1	B.2	1957	The site and surrounding areas are undeveloped and forested.
		1969	Photo similar to 1957. A cut line or access road appears to have been developed in the area south of PM-1.
		1994	A large clearing has been developed north of PM-1 (former Amoco plant). Several buildings and aboveground pipelines are visible in the clearing. Nine tanks are visible on the north side of the clearing. Two ponds are located on the south side of the building. A second clearing has been developed northwest of PM-1. Several buildings can be seen within this clearing. A possible water holding pond is visible south of these buildings, west of PM-1. The PM-1 Site has been cleared and aboveground piping is visible at the site. The pipeline right-of-way is visible south of the site but appears overgrown. A circular area to the east, which is suspected to be the flare pad, appears to have been cleared and then re-vegetated.
		2018	The former Amoco plant has been decommissioned and all buildings and tanks are no longer visible. The ponds are still apparent on the southern half of the clearing. The buildings located in the clearing northwest of PM-1 are no longer visible. The circular clearing east of PM-1 appears more prominent, with less vegetation than in the previous aerial image.
PM-2	C.2	1949	The area is undeveloped and forested.
		1957	Photo similar to 1949.
		1969	Photo similar to 1957. The area is mostly undeveloped and forested.
		1979	Photo similar to 1969. A right-of-way has been developed (the Pointed Mountain Pipeline).
		1991	An access road has been developed parallel to the right-of-way. A clearing on the east side of the right-of-way appears to have been cleared.
PM-3	D.2	1949	Area appears undeveloped and forested.
		1957	Photo similar to 1949. The area is undeveloped. A surface waterbody is visible east of the Site.
		1969	Photo similar to 1957.
		1979	Photo similar to 1969. A right-of-way (the Pointed Mountain Pipeline) appears to have been developed.
		1991	Photo similar to 1979.
PM-4	E.2	1949	Area appears undeveloped and forested. The Kotaneelee River is visible north and east of the site. A pond is visible to the west.
		1957	Photo similar to 1949. The area appears undeveloped and forested.
		1969	Photo similar to 1957. The area appears undeveloped and forested.
		1979	Photo similar to 1969. A right-of-way (the Pointed Mountain Pipeline) appears to have been developed.
		1991	Photo similar to 1979. The right-of-way appears overgrown.

Table 3.3-1. Aerial Photograph Observations

Site ID	Appendix	Photograph Date	Observations
PM-6	F.2	1949	The area is undeveloped and forested.
		1957	Photo similar to 1949.
		1969	Photo similar to 1957. A rectangular clearing to the north of PM-6 has been cleared. Several access roads have been developed to the west of PM-6.
		1979	The rectangular clearing has been extended southwards and now encompasses PM-6. An access road has been developed west of PM-6, intersecting with another access road. A rectangular area has been cleared west of PM-6. Several buildings and tanks are visible in this area (suspected Kotaneelee Gas Plant). Another cleared area, east of the gas plant, appears to have been developed. A right-of-way (the Pointed Mountain Pipeline) has been developed.
		1993	Photo similar to 1979.
PM-7	G.2	1949	The area is undeveloped and forested.
		1957	Photo similar to 1949.
		1969	Photo similar to 1957. Several access roads have been developed to the west and south of PM-7.
		1979	Photo similar to 1969. The pipeline right-of-way has been developed and a small clearing east of the right-of-way has been cleared. An access road west of PM-7 has been further developed and widened. A large industrial facility suspected to be the Kotaneelee Gas Plant has been developed northwest of PM-7. Several tanks are visible on this property. A smaller area has been cleared south of the facility, and northwest of PM-7. A creek is visible south of the facility and meanders southeast towards PM-7. A rectangular clearing has been developed north of PM-7 and is suspected to be an airstrip. Several cutlines have been developed radiating out from a clearing west of PM-7. A rectangular clearing is visible southwest of PM-7, on the west side of the road.
		1993	Photo similar to 1979. The southern end of the suspected airstrip and the large clearing west of PM-7 both appear to have vegetation re-growth.
PM-8	H.1	1950	The area is undeveloped and forested.
		1967	A long, rectangular clearing, likely an airstrip, has appeared east of PM-8. An access road has been developed south of PM-8.
		1986	A square clearing has been developed southeast of PM-8. A right-of-way (the Pointed Mountain Pipeline) has been developed. A square clearing has been developed east of PM-8 and is connected to the Pointed Mountain Pipeline with a small right-of-way. A large, cleared area has been developed on the west side of the access road.
		1988	A new rounded clearing appears to have been developed south of PM-8. A small pond may be present in that clearing. Ponded water appears on the square clearing east of PM-8. Buildings are visible on the clearing west of the access road (suspected Amoco Beaver River Gas Plant).
		1997	Photo similar to 1988. Much of the gas plant infrastructure appears to be removed with the exception of one building.
		2006	Photo similar to 1997. A new square clearing appears to have been developed to the north of the gas plant. Suspected buildings are visible on the north side of the airstrip.

Table 3.3-1. Aerial Photograph Observations

Site ID	Appendix	Photograph Date	Observations
PM-9	I.1	1950	The area is undeveloped and forested.
		1967	A rectangular clearing, likely an airstrip, and an access road have been developed east of PM-9.
		1986	A large square clearing with buildings has been developed north of PM-9. A right-of-way (the Pointed Mountain Pipeline) has been developed.
		1988	Several buildings, suspected tanks, and pipelines are visible on the clearing north of PM-9 (suspected Amoco Beaver River Gas Plant).
		1997	An access road has been developed to the north of PM-9, oriented east to west. Much of the Beaver River gas plant infrastructure appears to be removed with the exception of one building.
		2006	A square clearing has been developed to the north of the Beaver River gas plant. Additional buildings have been developed on the gas plant site and to the east of PM-9 (next to the airstrip). A large circular clearing has been developed southwest of PM-9.
PM-10	J.1	1950	The area is undeveloped and forested.
		1967	A long, rectangular clearing, possibly an airstrip, has appeared east of PM-10. An access road has been developed northwest of PM-10, connecting to the airstrip.
		1986	A clearing with a possible pond has been developed west of PM-10 (suspected flare). A right-of-way (the Pointed Mountain Pipeline) has been developed. A large clearing and access road have been developed north of PM-10.
		1988	Photo similar to 1986. Numerous tanks are visible on the west end of the suspected airstrip, east of PM-10.
		1997	Photo similar to 1988.
		2006	Photo similar to 1997. Additional buildings are visible north of the airstrip.

3.4 Geo-Administrative Areas

3.4.1 Northwest Territories Spatial Data Warehouse Geospatial Portal

A search of Government of the NWT Spatial Data Warehouse Geospatial Portal (Government of the NWT 2021) was conducted on September 20, 2021 for each of the Sites in NWT (i.e., PM-1, PM-2, PM-3, and PM-4). Searches were limited to the areas immediately surrounding the Sites (i.e., 300 m). These records provide information about the various types of development (e.g., transportation, utility, and communication corridors), conservation areas, settled land claims, federally managed lands, and Indigenous group-owned lands. Table 3.4-1 summarizes the information identified for each infrastructure location. Copies of the search results are provided in Appendices B.3 through E.3.

Table 3.4-1. Government of the Northwest Territories Geospatial Portal Information Summary

Site ID	Item	Identifier	Location
PM-1	Southwest Portion of Dehcho Region Land Withdrawal Area	Object ID 22246	Encompasses PM-1
	Pipeline	095B05	Shares right-of-way, suspected to be Pointed Mountain Pipeline
	Proposed MGP gas pipeline route	Object ID 40	Shares right-of-way with PM-1
	Active Mineral Lease, Jayhawk Frontier Exploration Ltd.	Object ID 45769, Lease Number NT-5618	Located ~1.1 km west of PM-1 infrastructure
PM-2	Southwest Portion of Dehcho Region Land Withdrawal Area	Object ID 22246	Encompasses PM-2
	Pipeline	095B05	Shares right-of-way, suspected to be Pointed Mountain Pipeline
	Proposed MGP gas pipeline route	Object ID 40	Shares right-of-way with PM-2
PM-3	Southwest Portion of Dehcho Region Land Withdrawal Area	Object ID 22246	Encompasses PM-3
	Pipeline	095B05	Shares right-of-way, suspected to be Pointed Mountain Pipeline
	Proposed MGP gas pipeline route	Object ID 40	Shares right-of-way with PM-3
PM-4	Southwest Portion of Dehcho Region Land Withdrawal Area	Object ID 22246	Encompasses PM-4
	Pipeline	095B05	Shares right-of-way, suspected to be Pointed Mountain Pipeline
	Proposed MGP gas pipeline route	Object ID 40	Shares right-of-way with PM-4

Note:
MGP = Mackenzie Gas Project

3.4.2 Government of Yukon GeoYukon Digital Map Viewer Database

A search of the Yukon's GeoYukon Digital Map Viewer database (Government of Yukon 2021a) was conducted on September 20, 2021 for each of the Sites in Yukon (PM-6 and PM-7). Searches were limited to the areas immediately surrounding the Sites (i.e., 300 m). These records provide information about environmental monitoring (including contaminated sites), forestry tenures, and infrastructure, development areas and land claims, land tenure, mining operations, oil and gas activities, parks and protected areas, and utilities. Table 3.4-2 summarizes the information identified for each infrastructure location.

Table 3.4-2. Government of Yukon GeoYukon Database Information Summary

Site ID	Item	Identifier	Location
PM-6	Kotaneelee Gas Plant Contaminated Site	Not available	~300 m west of PM-6
	Approved utility land license	095C01-001	Shares right-of-way, suspected to be Pointed Mountain Pipeline
	Approved industrial Land Disposition	095C01-001; PID 200001299	~210 m southwest of PM-6
PM-7	Approved utility land licence	095C01-001	Shares right-of-way, suspected to be Pointed Mountain Pipeline
	Approved industrial land licence	095C01-014	In square-shaped clearing immediately east of PM-7
	Approved roadway lease	095C01-008	~185 m east of PM-7

The Kotaneelee Gas Plant is listed as a contaminated site following multiple releases of lube oil, biproduct water, and other petroleum hydrocarbons (PHCs). Contaminants of concern include PHCs, salinity, and metals. Excavation was completed in 2017 and groundwater monitoring was conducted between 2015 and 2019. The plant is located approximately 300 m west of PM-6 (Government of Yukon 2021b).

Information on the airstrip adjacent to PM-6 was not available on the GeoYukon database. Copies of the search results for the PM-6 and PM-7 Sites are provided in Appendices F.3 and G.3.

3.4.3 Government of British Columbia iMapBC 2021 Land Use

A search of the Government of BC's iMapBC database was conducted on September 20, 2021 to determine the presence or absence of various administrative areas around the Sites at PM-8, PM-9, and PM-10 including:

- Forestry harvest authorizations, cut blocks, and road segments
- Oil and gas wells, pipelines, rights-of-way, road segments, sumps, and waste disposal areas
- Environmental monitoring stations
- Environmental remediation sites
- Crown leases and licences
- Groundwater wells

The search showed various administrative zones in the immediate area (i.e., 300 m radius) of the Sites located in BC (PM-8, PM-9, and PM-10). Records identified by this search are summarized in Table 3.4-3. Copies of the search results are provided in Appendices H.2 through J.2.

Table 3.4-3. Government of British Columbia Land Use Information Summary

Site ID	Geo-administrative Area Name	Identifier
PM-8	Utility right-of-way tenure (oil and gas pipeline)	Crown Lands file number 0308983
	Approved Petroleum Road development plan by Transeuro Beaver River Inc.	Petroleum Development Road R00027
	Amoco Beaver River Gas Plant Environmental Remediation Site, Beaver field well number B-68-J.	Environmental Remediation Site 54570838
PM-9	Utility right-of-way tenure (oil and gas pipeline)	Crown Lands file number 0294579
	Utility right-of-way tenure (oil and gas pipeline)	Crown Lands file number 0308983
PM-10	Utility right-of-way tenure (oil and gas pipeline)	Crown Lands file number 0294579
	Approved Petroleum Road development plan by Transeuro Beaver River Inc.	Petroleum Development Road R00027
	Pipeline area application by NorthRiver Midstream Operations GP Inc.	Application number 100114038
	Deactivated pipeline segment belonging to NorthRiver Midstream Operations GP Inc.	Application determination number 100084708
	Approved construction plan belonging to NorthRiver Midstream Operations GP Inc.	Pipeline area permit identifier 1457
	Amoco Beaver B-068-J Well	Surface hole status identifier 3895, well authority number 02727

3.5 Adjacent Infrastructure

3.5.1 Pipeline Records

Limited information was available on pipelines located in the NWT and Yukon. Only the Pointed Mountain Pipeline and a proposed MGP gas pipeline route were identified in the searches for PM-1, PM-2, PM-3, and PM-4 (Government of the NWT 2021). Search results are presented in Appendices B.3 through E.3.

One utility land licence was identified at PM-6 and PM-7 (Licence No. 95C01-001) which is the same licence provided by Westcoast (Westcoast 2020) and is anticipated to be for the Pointed Mountain Pipeline right-of-way. No pipeline infrastructure was identified during a search of the GeoYukon digital database (Government of Yukon 2021a). Search results are presented in Appendices F.3 and G.3.

One deactivated pipeline segment was identified beginning at PM-10 and continuing towards the southeast (summarized in Table 3.4-3). Pipeline infrastructure was not identified near PM-8 and PM-9 on iMapBC (Government of BC 2021). The findings are presented in Appendices H.2 through J.2.

3.5.2 Oil and Gas Well Records

No oil and gas wells were identified within 300 m of the aboveground infrastructure at any of the Sites. The search results are presented for each of the areas of aboveground infrastructure in Appendices B.3 through G.3 and H.2 through J.2.

3.5.3 Oil and Gas Sump Records

A search of the Government of the NWT's geospatial database for PM-1 through PM-4 did not identify any areas of industrial waste. An option to search for oil and gas sump records was not available (Government of the NWT 2021). Similarly, a search of GeoYukon (Government of Yukon 2021a) identified no additional information on potential oil and gas sumps and waste sites for PM-6 or PM-7.

A search of iMapBC (Government of BC 2021) identified one oil and gas sump and two oil and gas waste disposal site located approximately 890 m northwest of PM-9. Table 3.5-1 summarizes the findings. Search results are presented in Appendices H.2 through J.2.

Table 3.5-1. Summary of Oil and Gas Sump and Waste Disposal Sites

Site ID	Sump or Waste Disposal Site Identification	Proponent	Distance from Site [a] (m)
PM-8	CNOOC Beaver Sump No. 00743 (sump closed in July 2007)	CNOOC Petroleum North America ULC	~1,050
	Waste disposal site ID 489, disposal No. 1132, disposal code MBC	Nexen Energy ULC	~1,010
	Waste disposal site ID 408, disposal No. 1133, disposal code PO	Nexen Energy ULC	~890
PM-9	CNOOC Beaver Sump No. 00743 (sump closed in July 2007)	CNOOC Petroleum North America ULC	~1,275
	Waste disposal site ID 489, disposal No. 1132, disposal code MBC	Nexen Energy ULC	~1,255
	Waste disposal site ID 408, disposal No. 1133, disposal code PO	Nexen Energy ULC	~1,130
PM-10	CNOOC Beaver Sump No. 00743 (sump closed in July 2007)	CNOOC Petroleum North America ULC	~1,755
	Waste disposal site ID 489, disposal No. 1132, disposal code MBC	Nexen Energy ULC	~1,710
	Waste disposal site ID 408, disposal No. 1133, disposal code PO	Nexen Energy ULC	~1,595

[a] Measurements were completed using iMapBC's measurement tool

Notes:
MBC = mix-bury cover
No. = number
PO = pump-off

3.5.4 Water Well Records

Jacobs conducted a search of GeoYukon and iMapBC for records of water wells near the Sites. The NWT Geospatial database does not provide information on groundwater wells in the NWT. As such, Jacobs reviewed the Groundwater Information Network (GIN) (2021) for additional information on groundwater wells. No water wells were identified within 300 m of each of the Sites (Government of Yukon 2021a; GIN 2021; Government of BC 2021). Available search results are provided in Appendices H.2 through J.2.

3.6 Release and Spill Reports

Westcoast informed Jacobs of a 1,300 litre (L) generator diesel spill which occurred at KP 0.0 (PM-1) in 2018 as the result of a split diesel return line. The spill was reported to the Canada Energy Regulator (CER) (Event No. INC2018-110) and Office of the Regulator of Oil and Gas Operations (OROGO) (Reference No. 2018362).

The BC Oil and Gas Commission (BC OGC) provides a database of reported incidents in BC between 2009 and present-day. Jacobs completed a search of the BC OGC Incident Map on September 20, 2021 for reported incidents located within 1 km of PM-8, PM-9, and PM-10. No records of reported incidents were identified between 2009 and 2020 (BC OGC 2021). Information on releases and spills were not available on the NWT Geospatial or GeoYukon databases.

3.7 Tank and Tank Farm Records

Information on current or historic tanks or tank farms was not available on the NWT Geospatial database or GeoYukon. In September 2021, Jacobs reached out to several agencies, including the CER, the Government of the NWT Department of Environment and Natural Resources, Environment and Climate Change Canada, OROGO, and the Mackenzie Valley Land and Water Board. No records for tanks or tank farms were received for aboveground infrastructure locations in the NWT and Yukon.

Possible tank and tank farm records associated with aboveground infrastructure locations were searched through ERIS (including the Federal Identification Registry for Storage Tank Systems, Indian and Northern Affairs fuel tanks, National Defence and Canadian Forces fuel tanks, Parks Canada fuel storage tanks, and retail fuel storage tank databases). The ERIS search for the aboveground infrastructure locations produced no records associated with tanks. Complete ERIS search results are included in Appendix A.

3.8 Provincial and Territorial Contaminated Sites Registries

3.8.1 Government of the NWT Contaminated Sites Registry

The Government of Canada has presented a list of contaminated sites in the NWT, Yukon, and Nunavut, as part of the Northern Contaminated Sites Program. Jacobs reviewed the list of NWT sites in September 2021. None of the documented contaminated sites were located within 1 km of each of the Sites in the NWT (Government of Canada 2021).

3.8.2 Government of Yukon Contaminated Sites Database

Jacobs completed a search of the Yukon Government's Contaminated Site Database (Government of Yukon 2021b) on September 21, 2021, for registered contaminated sites within 1 km of PM-6 and PM-7. The Kotaneelee Gas Plant, located approximately 300 m west of PM-6, is listed as a contaminated site following multiple releases of lube oil, biproduct water, and other PHCs between 2004 and 2015.

Contaminants of concern include PHCs, salinity, and metals. Some remedial excavations have been completed and groundwater monitoring has been completed in the area; however, it is not clear how far the impacts extend towards PM-6. The search results for each of the Sites are presented in Appendices F.4 and G.4.

3.8.3 British Columbia Government Public Geographic Information System Mapping Tool

Provincially registered information regarding assessed sites throughout BC can be accessed through iMapBC. As of September 20, 2021, one assessed site, listed as an environmental remediation site, was listed within 300 m of the PM-9 Site. The remediation site is listed as the Amoco Beaver River Gas Plant, Beaver River Field Well Number B-68-J. The description indicates some discrepancy in the location of the site and coordinates provided suggest the site corresponds to the orphaned Beaver River Compressor Station, located approximately 400 m southwest of PM-8, and 100 m north of PM-9. This property is not associated with Westcoast assets. Copies of the search results are presented in Appendices H.3 through J.3.

3.9 Federal Contaminated Sites Inventory

Areas of interest in the NWT, Yukon, and BC were searched using the FCSI. No locations were found to encounter federally registered contaminated sites listed on the FCSI as of September 20, 2021. No federally registered contaminated sites were identified within a 500-m radius of the areas of interest (Treasury Board of Canada Secretariat 2015). FCSI search results are presented in for each of the Sites in Appendices B.4 through E.4, F.5 through G.5, and H.4 through J.4.

3.10 City Directory Searches

Due to the remote location of the Sites, city directory searches were not completed as part of this Phase I ESA.

3.11 Fire Insurance Map Search

Fire insurance maps are detailed, large-scale maps of industrial sites, cities, and smaller municipalities. A search for available fire insurance files was completed on September 23, 2021, through the UBC Library (UBC 2021b) and the University of Calgary Library (University of Calgary 2021). No fire insurance plans were identified for the areas of interest. As these sites are not associated with a municipal address, it is unlikely that such records are available.

3.12 Other Records

The following documents were reviewed to prepare for this Phase I ESA desktop review:

- Westcoast Energy Inc. (Westcoast). 2020. RGT Pipeline Abandonments Project Q1198- Engineering Scope of Work – Pointed Mountain Pipeline.

4. Area Reconnaissance

4.1 Property Inspections

Between August 17 and 20, 2021, Jacobs conducted visual inspections, consisting of an aerial fly over and ground-level reconnaissance of all of the Sites discussed herein. A number of photographs were taken during the inspections and are included for each of the Sites in Appendices B.5 through E.5, F.6, G.6, and H.5 through J.5.

4.1.1 PM-1 Site Reconnaissance

The PM-1 Site was inspected on August 21, 2021. Table 4.1-1 presents a summary of the observations. Photographs from the site reconnaissance are provided in Appendix B.5.

Table 4.1-1. Summary of PM-1 Site Reconnaissance

Site Feature	Description	Photograph(s) (Appendix B.5)
Site Conditions and Topography	Rolling topography with gentle slope towards the south. Ground surface was mostly dry at time of inspection with some standing water near pig launcher.	3
Current Land Use	▪ Compressor and pig sending station, onsite cathodic protection generator, flare stack, and riser. ▪ Located beside a decommissioned Amoco plant site. ▪ Risers belonging to Paramount. Located immediately west of PM-1. ▪ Main producer tie-in located approximately 100 m north of PM-1.	3 to 6
Surrounding Land Use	North: cleared area (former Amoco plant site), pipeline right-of-way West: Paramount risers, natural forested land South: pipeline right-of-way and natural forested land East: natural forested land and cleared area of former flare pit	1 to 6
Vegetation	▪ Short grasses and vegetation in immediate vicinity of aboveground infrastructure. ▪ Edge of pipeline right-of-way marked with tall deciduous forest and large bushes. ▪ Stressed vegetation was observed surrounding the aboveground infrastructure. ▪ Site representative indicated area had been treated with a broad-spectrum herbicide.	5, 7 9 to 11, 14 to 21

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Table 4.1-1. Summary of PM-1 Site Reconnaissance

Site Feature	Description	Photograph(s) (Appendix B.5)
Buildings and Structures	▪ Aboveground risers from former producer tie-in located approximately 150 m north of PM-1. ▪ One elevated metal, generator building was observed on a platform. Site representative indicated the building was approximately 25 years old. ▪ No insulation was observed within the building; however, several heaters were observed. ▪ Numerous pipeline risers belonging to Westcoast. ▪ Pipeline risers on west side of PM-1 infrastructure belonging to Paramount. ▪ Pig catch basin (with unknown fluid leaking and being collected in open tub). ▪ Flare associated with PM-1 located to the east of main infrastructure location.	2, 38 8, 16, 31 to 35 25 to 27 36, 37
Hazardous Materials	▪ Stored diesel and propane in tanks. ▪ Various chemicals were observed in a cabinet within the generator building. ▪ Two lead-acid car batteries were observed in the generator buildings.	31 to 35
Unidentified Substances	▪ Unknown fluid was observed leaking from the pig catch basin and was being collected in the open tub below. Tub was overflowing at time of reconnaissance. ▪ Suspected grease was observed collecting on the aboveground infrastructure piping.	25 to 27 22
Odour	Occasional hydrocarbon/diesel odour	
Ditches or Standing Water	Some standing water was observed near the pig launcher.	
Electrical Panel(s) or Boxes	▪ Box labelled as high voltage electric lines for the pig unit and cathodic protection system. ▪ Electric control panel inside generator building.	29 31
Waste Management Practices	▪ Garbage was collected in the generator building. ▪ A pile of scrap metal was observed on the ground between the diesel tanks and generator building. ▪ Blue tarp was observed beneath the generator building at the location of the 2018 diesel spill.	32 30 16
Fill	Fill was observed beneath propane tanks and generator building	
Storage Tanks and Containers	▪ Two aboveground diesel tanks (8,620 L capacity) built in 2002 ▪ Four aboveground propane tanks ▪ Riser has oil-filled tanks and pressure gauges	7 to 9, 12 to14 6 17, 20

Table 4.1-1. Summary of PM-1 Site Reconnaissance

Site Feature	Description	Photograph(s) (Appendix B.5)
Additional Observations	▪ Field representative indicated Amoco plant may have had salinity issues. Monitoring wells were observed in the area of the former plant. ▪ Suspected sewage pit and suspected process water pond that are covered and fenced located east of PM-1 infrastructure on former Amoco plant site.	

Jacobs identified several APECs associated with PM-1 infrastructure which are presented in Table 5-1.

4.1.2 PM-2 Site Reconnaissance

The aboveground infrastructure at PM-2 was inspected on foot on August 19, 2021. Table 4.1-2 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix C.5.

Table 4.1-2. Summary of PM-2 Reconnaissance

Site Feature	Description	Photograph(s) Appendix C.5
Site Conditions and Topography	Site was dry at the time of the reconnaissance. Rolling topography with gentle slope towards the south.	1
Current Land Use	Pipeline right-of-way with one producer tie-in riser.	2
Surrounding Land Use	North: pipeline right-of-way and natural forested land. West: forestry access road and natural forested land. South: pipeline right-of-way and natural forested land. East: natural forested land.	
Vegetation	▪ Tall native grasses within pipeline right-of-way. ▪ Natural forest on either side of pipeline right-of-way. ▪ Vegetation had been cleared for recent surveys.	3
Buildings and Structures	One riser was observed in the right-of-way surrounded by red metal pipe guard.	3, 8, 9
Hazardous Materials	None observed.	
Unidentified Substances	None observed.	
Odour	None observed.	
Ditches or Standing Water	None observed. Site was dry at time of site reconnaissance.	
Electrical Panel(s) or Boxes	None observed.	

Table 4.1-2. Summary of PM-2 Reconnaissance

Site Feature	Description	Photograph(s) Appendix C.5
Waste Management Practices	None observed.	
Fill	None observed.	
Storage Tanks and Containers	None observed.	
Additional Observations	None.	

Jacobs did not identify any APECs associated with PM-2 infrastructure.

4.1.3 PM-3 Site Reconnaissance

The aboveground infrastructure at PM-3 was inspected on foot on August 19, 2021. Table 4.1-3 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix D.5.

Table 4.1-3. Summary of PM-3 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix D.5
Site Conditions and Topography	Site was dry at the time of the reconnaissance. Topography was flat along the right-of-way.	1
Current Land Use	Pipeline right-of-way with one nitrogen vent riser.	1 to 7
Surrounding Land Use	North: natural forested land, pipeline right-of-way West: natural forested land South: natural forested land, pipeline right-of-way, Kotaneelee River at the base of an escarpment East: natural forested land	
Vegetation	▪ Tall native grasses within pipeline right-of-way. ▪ Natural forest on either side of pipeline right-of-way.	
Buildings and Structures	One riser was observed in the right-of-way surrounded by red metal pipe guard.	2 to 7
Hazardous Materials	None observed.	
Unidentified Substances	None observed.	
Odour	None observed.	
Ditches or Standing Water	None observed. Site was dry at time of site reconnaissance.	
Electrical Panel(s) or Boxes	None observed.	

Table 4.1-3. Summary of PM-3 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix D.5
Waste Management Practices	None observed.	
Fill	None observed.	
Storage Tanks and Containers	None observed.	
Additional Observations	▪ Evidence of excavations and fill suspected to be from removal of the pipeline crossing at the Kotaneelee River (between KP 18.04 and KP 19.25) ▪ Overgrown vegetation on right-of-way at time of site reconnaissance.	7

Disturbed soil was observed during the site reconnaissance and suspected to be from the removal of the exposed section of pipeline at the Kotaneelee River crossing which occurred in winter 2015 and 2016 (Westcoast 2020). Pipeline removal activities were monitored by Triton Environmental Consultants (Triton). During excavation activities, one spill, less than two L of hydraulic oil) was observed on snow and brush from the right-of-way. The report does not indicate if the spill occurred on the north or south side of the river (i.e., PM-3 or PM-4); however, the affected soil was cleaned up immediately in accordance with the prepared Spill Contingency Plan (Triton 2016). Jacobs did not identify any APECs associated with PM-3 infrastructure.

4.1.4 PM-4 Site Reconnaissance

The aboveground infrastructure at PM-4 was inspected on foot on August 19, 2021. Table 4.1-4 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix E.5.

Table 4.1-4. Summary of PM-4 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix E.5
Site Conditions and Topography	Site had recently been flooded and wet soil was observed around PM-4 infrastructure at the time of reconnaissance. Site topography was flat along the pipeline right-of-way.	3
Current Land Use	Pipeline right-of-way with one nitrogen vent riser.	3 to 7
Surrounding Land Use	North: pipeline right-of-way, Kotaneelee River West: natural forested land South: pipeline right-of-way and natural forested land East: natural forested land	

Table 4.1-4. Summary of PM-4 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix E.5
Vegetation	▪ Tall native grasses within pipeline right-of-way. ▪ Edge of right-of-way marked with tall deciduous forest and large bushes. ▪ Several dead trees observed southeast of PM-4 infrastructure but were still standing.	2
Buildings and Structures	One riser was observed on the west side of the right-of-way surrounded by red metal pipe guard.	3 to 7
Hazardous Materials	None observed.	
Unidentified Substances	None observed.	
Odour	None observed.	
Ditches or Standing Water	None observed. Site was dry at time of site reconnaissance.	
Electrical Panel(s) or Boxes	None observed.	
Waste Management Practices	None observed.	
Fill	None observed.	
Storage Tanks and Containers	None observed.	
Additional Observations	▪ Evidence of excavations and fill suspected to be from removal of the pipeline crossing at the Kotaneelee River (between KP 18.04 and KP 19.25) ▪ Overgrown vegetation on right-of-way at time of site reconnaissance.	

Disturbed soil was observed during the Site reconnaissance and is suspected to be from the removal of the exposed section of pipeline at the Kotaneelee River crossing which occurred in winter 2015 and 2016 (Westcoast 2020), as described above. Jacobs did not identify any APECs associated with PM-4 infrastructure.

4.1.5 PM-6 Site Reconnaissance

The aboveground infrastructure at PM-6 was inspected on foot on August 19, 2021. Table 4.1-5 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix F.6.

Table 4.1-5. Summary of PM-6 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix F.6
Site Conditions and Topography	Site was dry at the time of the reconnaissance. Topography was flat.	
Current Land Use	Pipeline right-of-way with aboveground risers, valves and piping, and grass airstrip.	2 to 7
Surrounding Land Use	North: grass airstrip West: natural forested land, gravel access road, Kotaneelee Gas Plant South: grass airstrip, pipeline right-of-way, natural forested land East: grass airstrip, natural forested land	
Vegetation	▪ Short grasses and vegetation were observed in immediate vicinity of aboveground infrastructure. ▪ Edge of right-of-way and grass airstrip marked with mix of coniferous and deciduous trees.	6
Buildings and Structures	▪ One metal building reportedly owned by another operator. Age of building unknown. Building did not appear to be insulated. ▪ Numerous aboveground pipes with valves on pipe supports observed on grass airstrip. ▪ Two aboveground pipes and valves connected to adjacent meter building (building owned by Paramount). ▪ Two corrugated metal culverts around pipe valve and riser.	7, 11 6 11 9, 10
Hazardous Materials	▪ Piping, valves, a heater, metering equipment, and two small tanks (contents unknown) were observed in the meter building.	12, 13
Unidentified Substances	None observed.	
Odour	None observed.	
Ditches or Standing Water	None observed. Site was dry at time of site reconnaissance.	
Electrical Panel(s) or Boxes	▪ Electrical equipment was observed within the meter building. ▪ Communications equipment and a tower were observed immediately south of the meter building.	12, 15
Waste Management Practices	Garbage waste was observed in a garbage can within the meter building (owned by Paramount).	12
Fill	None observed.	
Storage Tanks and Containers	Two small tanks were observed in the meter building (owned by Paramount). The contents of the tanks were unknown.	13
Additional Observations	Smoke was observed at the northern end of the grass airstrip. The source of the smoke was not determined.	15

The meter building located west of the PM-6 aboveground infrastructure is owned and operated by Paramount. As such, it is not considered an APEC related to Westcoast activities. However, two pipes located on the east side of the building, are to be abandoned by Westcoast, and have been considered when determining APECs. Jacobs identified several APECs associated with PM-6 infrastructure which are presented in Table 5-1.

4.1.6 PM-7 Site Reconnaissance

The aboveground infrastructure at PM-7 was inspected on foot on August 20, 2021. Table 4.1-6 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix G.6.

Table 4.1-6. Summary of PM-7 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix G.6
Site Conditions and Topography	Topography was flat.	
Current Land Use	Electric sending station. Former pig launching facility and producer tie-in.	1, 2
Surrounding Land Use	North: pipeline right-of-way and natural forested land. West: natural forested land (significant gas plant infrastructure to the northwest) South: pipeline right-of-way and natural forested land East: cleared area (flare pad)	
Vegetation	▪ Short native grasses and vegetation were observed in immediate vicinity of aboveground infrastructure ▪ Tall native grasses and vegetation were observed on the adjacent flare pad ▪ Edge of right-of-way and flare pad marked with mix of coniferous and deciduous trees ▪ Stressed vegetation was observed beneath PM-7 infrastructure	3 22 6, 13
Buildings and Structures	▪ Elevated metal building on support structure with stairs. The building contained a generator and electrical panel ▪ Pig launcher ▪ Cathodic protection ▪ Numerous aboveground pipes with valves on pipe supports ▪ Tank supports (for diesel and propane tanks)	4, 13 2, 7 4
Hazardous Materials	▪ Diesel and propane stored in tanks onsite ▪ Containers of Duron UHP, a diesel engine lubricant, were observed in the building	18
Unidentified Substances	Suspected water with a hydrocarbon residue was observed to be collecting in a container beneath the pig launcher	
Odours and Staining	▪ Diesel exhaust odour was observed outside of the generator building. ▪ The soil beneath the diesel tank was observed to be stained at the time of site reconnaissance.	12

Table 4.1-6. Summary of PM-7 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix G.6
Ditches or Standing Water	None observed. Site was dry at time of site reconnaissance	
Electrical Panel(s) or Boxes	▪ Electrical control structure was observed on the south side of the building. ▪ An electrical panel was observed in the building. ▪ A marker indicating a buried cable was observed at the northwest corner of PM-7.	6 17 19
Waste Management Practices	None observed.	
Fill	None observed.	
Storage Tanks and Containers	▪ One aboveground diesel tank ▪ Four aboveground propane tanks	8 to 12
Additional Observations	▪ A pile of concrete blocks was observed in the forest northwest of PM-7. ▪ Seasonal creek observed crossing the northeast corner of the flare pad and running along the base of the flare.	20 21 to 24

Jacobs identified several APECs associated with PM-7 infrastructure which are presented in Table 5-1.

4.1.7 PM-8 Site Reconnaissance

The aboveground infrastructure at PM-8 was inspected on foot on August 19, 2021. Table 4.1-7 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix H.5.

Table 4.1-7. Summary of PM-8 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix H.5
Site Conditions and Topography	Topography was flat.	1
Current Land Use	Pipeline right-of-way with one aboveground elbow riser.	1
Surrounding Land Use	North: natural forested land and pipeline right-of-way West: natural forested land and access road South: natural forested land and pipeline right-of-way East: cleared area (former flare pad) and natural forested land. Grass airstrip located approximately 450 m east of PM-8	
Vegetation	▪ Tall native grasses and vegetation were observed within the right-of-way. Right-of-way was overgrown with bushes to the north. ▪ Edge of right-of-way and flare pad marked with tall deciduous forest and large bushes.	2 to 7

Table 4.1-7. Summary of PM-8 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix H.5
Buildings and Structures	▪ One aboveground elbow pipe with red metal pipe guard. ▪ Sign indicating buried cathodic protection cables observed on the right-of-way.	2 to 10
Hazardous Materials	None observed.	
Unidentified Substances	None observed.	
Odour	None observed.	
Ditches or Standing Water	Standing water was observed around the riser and across the right-of-way. Two square holding ponds were observed approximately 260 m southwest of PM-8 infrastructure, at the end of the grass airstrip.	11
Electrical Panel(s) or Boxes	A sign indicating buried cathodic protection cables were present was observed on the right-of-way.	10
Waste Management Practices	Two piles of concrete blocks were observed on the edge of the right-of-way (suspected to be supports from former receiving barrel).	8, 9
Fill	None observed.	
Storage Tanks and Containers	None observed.	
Additional Observations	None	

Jacobs identified several APECs associated with PM-8 infrastructure which are presented in Table 5-1.

4.1.8 PM-9 Site Reconnaissance

The aboveground infrastructure at PM-9 was inspected on foot on August 19, 2021. Table 4.1-8 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix I.5.

Table 4.1-8. Summary of PM-9 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix I.5
Site Conditions and Topography	Topography was flat with a gentle slope towards the south. The area was mostly dry with some small areas of standing water at the time of the site reconnaissance.	7
Current Land Use	Historic pig launcher location with generator building and fuel supply. Majority of infrastructure is now owned and operated by NRM. Concrete blocks and capped elbow pipe belong to Westcoast.	

Table 4.1-8. Summary of PM-9 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix I.5
Surrounding Land Use	North: vacant land, location of decommissioned plant West: natural forested land South: natural forested land and pipeline right-of-way East: natural forested land and forestry access road	
Vegetation	▪ Tall native grasses and short bushes were observed around the aboveground infrastructure. ▪ Stressed vegetation was observed immediately around the aboveground infrastructure (including elbow pipe, risers, tanks, and building).	3, 4, 6, 8
Buildings and Structures	▪ Pig launcher (owned by NRM). ▪ Concrete blocks and pipe support from historic pig launcher (Westcoast). ▪ One metal generator building on platform with stairs (owned by NRM). ▪ One aboveground riser (owned by NRM). ▪ Capped elbow pipe (Westcoast).	2
Hazardous Materials	Diesel and propane were stored in aboveground tanks onsite.	
Unidentified Substances	An unidentified substance was observed dripping from the capped elbow pipe onto the soil.	11
Odours and Stains	Stained soil was observed beneath the capped elbow riser.	11
Ditches or Standing Water	Standing water was observed around the riser and across the right-of-way.	
Electrical Panel(s) or Boxes	None observed. The interior of the building was not inspected as it was not a Westcoast asset.	
Waste Management Practices	▪ Five large metal bolts were observed on the concrete supports near the capped elbow pipe. ▪ Several empty drums were observed around the propane tanks, reportedly used to store jet fuel. ▪ A single drum was observed on its side immediately east of the aboveground riser. Contents were not determined.	10 8, 9
Fill	None observed.	
Storage Tanks and Containers	▪ One elevated diesel tank (owned by NRM) ▪ Four propane tanks (owned by NRM) ▪ One white tank (contents unknown) adjacent to the diesel tank (owned by NRM)	
Additional Observations	None	

Jacobs identified several APECs associated with PM-9 infrastructure; however, only those presently owned by Westcoast are presented in Table 5-1. All other APECs are included in Table 5-2.

4.1.9 PM-10 Site Reconnaissance

The aboveground infrastructure at PM-10 was inspected on foot on August 19, 2021. Table 4.1-9 presents a summary of the findings. Photographs from the site reconnaissance are provided in Appendix J.5.

Table 4.1-9. Summary of PM-10 Site Reconnaissance

Site Feature	Description	Photograph(s) Appendix J.5
Site Conditions and Topography	The topography was flat. The site was dry at the time of reconnaissance.	
Current Land Use	Pipeline right-of-way for the Pointed Mountain Pipeline and Beaver River Pipeline.	1, 2
Surrounding Land Use	North: pipeline right-of-way, PM-9 infrastructure West: cleared area (flare operated by another operator) and natural forested land South: pipeline right-of-way, unnamed creek approximately 100 m from PM-10, and natural forested land East: natural forested land	
Vegetation	▪ Tall native grasses and short bushes were observed on the pipeline right-of-way. ▪ Edge of right-of-way was marked with tall forest with mix of coniferous and deciduous trees. ▪ Stressed vegetation was observed immediately around the aboveground infrastructure.	3 to 14 3, 5, 10 to 14
Buildings and Structures	▪ Aboveground risers, pig receiver, stairs, and platform ▪ Pig launcher (operated by NRM).	2 to 6
Hazardous Materials	None observed.	
Unidentified Substances	None observed.	
Odours and Stains	None observed.	
Ditches or Standing Water	None observed.	
Electrical Panel(s) or Boxes	None observed.	
Waste Management Practices	None observed.	
Fill	None observed.	
Storage Tanks and Containers	None observed.	
Additional Observations	Flare pad operated by another producer located west of PM-10.	

Jacobs identified several APECs associated with PM-10 infrastructure; however, only those presently owned by Westcoast are presented in Table 5-1. All other APECs are included in Table 5-2.

4.2 Interviews

In August 2020 and October 2021, Jacobs' personnel interviewed Mr. Rob Enax, an operator for NRM. Mr. Enax's knowledge of the Pointed Mountain Pipeline and the aforementioned Sites began approximately 17 years ago.

Relevant information provided by Mr. Enax is summarized in Table 4.2-1. Questions related to Site operations or infrastructure for which Mr. Enax had no response have been omitted from the summary in Table 4.1-1. Complete interview questionnaires are provided for each Site in Appendices B.6 through E.6, F.7, G.7, and H.6, through J.6.

Table 4.2-1. Summary of Operator Interviews

Site ID	Relevant Information
PM-1	General Description of Area ▪ The site has been used as a pigging station. There is another pigging station nearby operated by another operator. ▪ Documented diesel spill occurred near the generator in 2018. ▪ Westcoast contracted herbicide (broad) treatment of PM-1. ▪ Drainage flows towards the pigging barrel area. Historical Westcoast Infrastructure ▪ Former tanks associated with pigging activities contained diesel, methanol (15,000 L tank), and inhibitor. ▪ Generator building and flare stack removed. ▪ Backfill had been brought to PM-1 to level the ground but interviewee was unaware of any excavations. Current Westcoast Infrastructure ▪ One pigging barrel and some scrap metal remains. All historic waste was contained in drums or waste containers until it could be flown offsite. Non-Westcoast Activities ▪ Decommissioned Amoco plant located northeast of PM-1. ▪ Water retention ponds associated with decommissioned Amoco plant.
PM-2	General Description of Area ▪ The site is a former producer tie-in. The riser was installed but it was not clear if it was ever operated. ▪ Wells were drilled in the hills to the west but not clear if any gas ever came from them. Current Westcoast Infrastructure ▪ One producer tie-in riser. The land immediately around the riser would be backfill from the riser installation. Non-Westcoast Activities ▪ High-grade road located on the west side of the site that leads to a gas well.

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Table 4.2-1. Summary of Operator Interviews

Site ID	Relevant Information
PM-3	General Description of Area ▪ The site has been used as a pipeline right-of-way. Historical Westcoast Infrastructure ▪ Pipeline segment removed beneath river. Reclamation in area of pipeline segment would have occurred. Current Westcoast Infrastructure ▪ One pipeline riser Non-Westcoast Activities ▪ Reclamation in area of pipeline segment removal (between KP 18.04 to 19.25, Kotaneelee River Crossing).
PM-4	General Description of Area ▪ The site has been used as a pipeline right-of-way. Historical Westcoast Infrastructure ▪ Pipeline segment removed beneath river. Reclamation in area of pipeline segment would have occurred. Current Westcoast Infrastructure ▪ One pipeline riser Non-Westcoast Activities ▪ Reclamation in area of pipeline segment removal (between KP 18.04 to 19.25, Kotaneelee River Crossing).
PM-6	General Description of Area ▪ The site has been used as a producer tie-in location. ▪ There is a grass airstrip to the east and a high-grade road to the west. Historical Westcoast Infrastructure ▪ A 150-millimetre (mm) kicker pipeline was run from the producer tie-in location (PM-6) to the current pig launching barrel (PM-7) in the winter of 2005 to 2006. ▪ Some backfilling occurred over the pipeline beneath the airstrip. ▪ Subcontractor occasionally treated the site with a broadleaf treatment for weed control. This was not completed in 2021. Current Westcoast Infrastructure ▪ Two pipes connect to the metering station. ▪ Pipeline risers and associated valves. Non-Westcoast Activities ▪ Metering station located approximately 60 m west of the PM-6 infrastructure. Westcoast deactivated the pipeline up to the metering station. ▪ Some drums of fuel were stored on the airstrip adjacent to the PM-6 infrastructure, but no soil staining or spills were observed. ▪ Kotaneelee Gas Plant is located up the hill to the west.

Table 4.2-1. Summary of Operator Interviews

Site ID	Relevant Information
PM-7	General Description of Area ▪ End of deactivated pipeline. Historically used as a pigging station. ▪ Large Kotaneelee Gas Plant in the area. ▪ Small stream crosses the flare pad ~50 m away from the infrastructure. Historic Westcoast Activities ▪ Historic use of methanol, inhibitor (type of inhibitor not specified) and diesel on site. ▪ Generated waste would have been flown offsite. ▪ When Pointed Mountain Pipeline was deactivated, new ground flare beds were put in and the flares were tied together. New pipeline was put in between PM-7 and PM-10. ▪ Subcontractor has treated the site with a broad treatment for weed control. Non-Westcoast Activities ▪ Tank farm at the Kotaneelee Gas Plant.
PM-8	General Description of Area ▪ The site was formerly the receiving end of the Pointed Mountain Pipeline. ▪ One riser located on the right-of-way. Historical Westcoast Infrastructure ▪ Pig receiving barrel moved to current location (PM-10) sometime around 2002 and 2003. ▪ Flare pad to the east. ▪ Waste would have been collected and flown offsite. Current Westcoast Infrastructure ▪ One pipeline riser ▪ Concrete blocks on edge of right-of-way from former pig receiving barrel or to place around the riser to make sure it was not struck by vehicles. Non-Westcoast Activities ▪ Quest Air (formerly Amoco) site located to the south. Presently being cleaned up as part of a BC OGC orphaned site fund.
PM-9	General Description of Area ▪ The site was formerly a producer tie-in to the adjacent Quest Air (formerly Amoco) facility and a generator station. ▪ Pipe came out of the ground, looped, then went back into the ground at this location. ▪ Producer tied into a 300-mm, then 200-mm pipeline at the spot. Historical Westcoast Infrastructure ▪ Generator used to be located on the north side of the present-day risers before it was relocated. Interviewee recalls stained soil at the location of the former generator, north of the risers, suspected to be from generator exhaust. ▪ 7500 litre, single-walled diesel tank, in secondary containment, was located next to the former generator. ▪ Subcontractor has treated the site with a broad treatment for weed control. ▪ Permanent crossing over the pipe was backfilled (to allow for vehicle traffic). Current Westcoast Infrastructure ▪ Pipe supports and one pipe elbow. ▪ Cathodic protection cable runs downstream from PM-9 and then into the trees. Non-Westcoast Activities ▪ Quest Air (formerly Amoco) site located immediately west. Presently being cleaned up as part of a BC OGC orphaned site fund. Large tank farm associated with this facility was located approximately 150 m from PM-9 (contents unknown). ▪ Diesel tank and propane tanks for metering station at location presently.

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Table 4.2-1. Summary of Operator Interviews

Site ID	Relevant Information
PM-10	General Description of Area ▪ The surrounding area was historically used as a pigging station and location of a flare. ▪ The location of the receiving area and flare pad and stack were moved from an area northeast of PM-10 at the end of the airstrip. Historical Westcoast Infrastructure ▪ Former tanks associated with pigging activities contained diesel, methanol (15,000 L tank), and inhibitor. ▪ Waste was stored onsite until it could be flown off or removed on winter roads. ▪ Subcontractor has treated the site with a broad treatment for weed control. ▪ Interviewee was unaware of releases or spills on neighbouring properties.

5. Phase I Findings and Recommendations

The results of the desktop review and visits are summarized in the following tables. Table 5-1 presents a summary of the APECs associated with current and former activities that have the potential to result in environmental impacts.

Table 5-1 presents an evaluation of the information presented in Sections 2, 3, and 4 relating to the areas with aboveground infrastructure investigated as part of this Phase I ESA.

Table 5-1. APEC Summary

Site ID	Identified APECs	COPCs
PM-1	Former tanks: methanol (15,000 L), diesel, inhibitor (tanks have previously been removed; location of tanks and type of inhibitor not provided)	Methanol Diesel – PHC F1-F4, BTEX, PAHs
	Two diesel tanks, 8,620-L capacity	PHC F1-F4, BTEX, PAHs
	Pig launcher, unidentified substance leaking from pig catch basin	PHC F1-F4, BTEX, PAHs
	Generator building (location of 2018 diesel spill)	PHC F1-F4, BTEX, PAHs
	Former flare stack and flare pad	PHC F1-F4, BTEX, PAHs Herbicides/pesticides
	Risers with associated valves and actuators. Hydraulic fluid observed leaking from the actuator system.	PHC F1-F4, BTEX, PAHs
	Producer tie-in piping north of PM-1 infrastructure	PHC F1-F4, BTEX, PAHs
	Areas sprayed for broadleaf control – Note areas of stressed vegetation	Herbicides
PM-2	None identified	
PM-3	None identified	
PM-4	None identified	
PM-6	Aboveground piping and valves	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1- F4), PAHs
	Tie-in to meter building	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1- F4)
	Areas sprayed for broadleaf control historically	Herbicides
PM-7	Diesel tank with soil staining beneath	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
	Generator building	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1- F4), PAHs
	Aboveground piping and valves, pig launcher, nitrogen vents, and valves	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1- F4), PAHs
	Historic flare stack and flare pad	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1- F4) PAHs
	Areas sprayed for broadleaf control – Note areas of stressed vegetation	Herbicides
	Historic use of methanol and inhibitor during operation (infrastructure associated with methanol and inhibitor use have previously been removed; location of infrastructure not provided)	Diesel associated with inhibitor – Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs, methanol

Phase I Environmental Site Assessment

Table 5-1. APEC Summary

Site ID	Identified APECs	COPCs
PM-8	Location of former receiving barrel. Exact location of former barrel in right-of-way unknown.	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
	One aboveground elbow pipe	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
	Former flare and flare pad	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
PM-9	Former pig supports (concrete blocks and metal support)	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
	Capped elbow pipe with leaking substance	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
	Red drum (contents unknown) on its side near concrete supports	Hydrocarbons (including VPH, LEPH, HEPH, BTEX, PHC F1-F4), PAHs
	Areas sprayed for broadleaf control – Note areas of stressed vegetation	Herbicides
PM-10	Aboveground piping and valves, stairs, and platform, pipe supports, valves, and actuators	Hydrocarbons (including VPH, LEPH, HEPH, BTEX), PAHs
	Former tanks: methanol (15,000 L), diesel, inhibitor (tanks have previously been removed; location of tanks and type of inhibitor not provided)	Methanol Diesel – Hydrocarbons (including VPH, LEPH, HEPH, BTEX), PAHs
	Areas sprayed for broadleaf control – Note areas of stressed vegetation	Herbicides

Notes:

BTEX = benzene, toluene, ethylbenzene, and xylenes
F = fraction(s)
HEPH = heavy extractable petroleum hydrocarbon
LEPH = light extractable petroleum hydrocarbon
PAH = polycyclic aromatic hydrocarbon
VPH = volatile petroleum hydrocarbon

Based on the above analysis, intrusive investigation is warranted to confirm the presence of COPCs in the subsurface at Sites PM-1, PM-6, PM-7, PM-8, PM-9, and PM-10. In accordance with CER requirements, Appendix K provides a Phase II ESA work plan outlining the procedures to be used in the investigation (CER 2020).

Table 5-2 provides an evaluation of the information presented in Sections 2, 3, and 4 relating to the non-Westcoast activities and structures adjacent to Sites investigated as part of this Phase I ESA. These potential issues are presented for information purposes only.

Table 5-2. Summary of Potential Environmental Impacts from Activities Outside of Westcoast Operations

Site ID	Activities Outside of Westcoast Operations Creating a Potential Environmental Impact
PM-1	1. Decommissioned Amoco plant north of PM-1 reportedly the source of potential contamination (salinity impacts). 2. NPS14 aboveground infrastructure located immediately west of PM-1 infrastructure, belonging to Paramount. 3. Publicly available aerial imagery water holding pond located approximately 280 m east of PM-1. Observed to be covered and fenced at the time of site reconnaissance. Contents are unknown. 4. Abandoned gas well located approximately 510 m northeast licensed to Paramount.
PM-2	None identified

Table 5-2. Summary of Potential Environmental Impacts from Activities Outside of Westcoast Operations

Site ID	Activities Outside of Westcoast Operations Creating a Potential Environmental Impact
PM-3	None identified
PM-4	None identified
PM-6	1. Meter building located ~60 m west of PM-6 infrastructure containing garbage waste, heater, compressed gas canisters, communication, and electrical equipment. 2. Airstrip located immediately east of PM-6 infrastructure with reported storage of fuel drums. 3. Kotaneelee Gas Plant contaminated site ~ 300 m west of PM-6 with multiple reported spills of lube oil, biproduct water, and other hydrocarbons. Numerous tanks visible on historic aerial imagery.
PM-7	1. Kotaneelee Gas Plant contaminated site ~ 500 m northwest of PM-7 with multiple reported spills of lube oil, biproduct water, and other hydrocarbons. Numerous tanks visible on historic aerial imagery.
PM-8	1. Publicly available aerial imagery shows two holding ponds located approximately 260 m southeast of PM-8 infrastructure. Contents are unknown. 2. Former Amoco Beaver River Gas Plant Environmental Remediation Site approximately 385 m west of PM-8 infrastructure.
PM-9	1. Amoco Beaver River Gas Plant Environmental Remediation Site, Beaver field well no B-68-J (some confusion on database regarding actual location of environmental remediation site). 2. NRM infrastructure including diesel and propane tanks, generator building, pig launcher, risers.
PM-10	1. Pig launcher and associated infrastructure owned by NRM (Beaver River Pipeline). 2. Flare and flare pad operated by NRM location approximately 150 m west of PM-10. 3. Grass airstrip located approximately 350 m northeast of PM-10. Numerous tanks visible on the airstrip in historic aerial imagery from 1988. 4. Amoco Beaver River Gas Plant Environmental Remediation Site, Beaver field well no B-68-J (some confusion on database regarding actual location of environmental remediation site). Located approximately 500 m north of PM-10.

6. Closure

The conclusions in this Phase I ESA represent the best judgement of the assessor based on the site conditions observed during field site visits between August 17 and 20, 2021 and current environmental standards and guidelines. Section 7 provides limitations to the Phase I ESA.

Jacobs trusts that the Phase I ESA findings and recommendations meet your present requirements. Should you have any comments or concerns, please contact Patrick Kalita via email (patrick.kalita@jacobs.com).

Yours truly,
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7. Limitations

In preparing this Phase I ESA, Jacobs relied, in whole or in part, on data and information provided by Westcoast and third-parties, which has not been independently verified by Jacobs and which Jacobs has assumed to be accurate, complete, reliable, and current. Therefore, while Jacobs has used its best efforts in preparing this Phase I ESA, Jacobs does not warrant or guarantee the conclusions set forth, which are dependent or based upon data, information, or statements supplied by third-parties or Westcoast.

The use of this Phase I ESA, or any information contained herein, if by any party other than Westcoast, shall be at the sole risk of such party, and shall constitute a release and agreement by such party to defend and indemnify Jacobs and its affiliates, officers, employees, and subcontractors from and against any liability for direct, indirect, incidental, consequential, or special loss or damage, or other liability of any nature arising from its use of the Phase I ESA or reliance upon any of its content. To the maximum extent permitted by law, such release from, and indemnification against, liability shall apply in contract, tort (including negligence), strict liability, or any other theory of liability.

Related to any claims, brought against Jacobs by Westcoast, arising out of, or related to, the provision of this Phase I ESA to Westcoast or the failure of Jacobs to provide any services related to the provision of this Phase I ESA, the total liability of Jacobs to Westcoast shall not exceed the lesser of any direct damages incurred by Westcoast, or the amount of the fees paid to Jacobs for this Phase I ESA, whether such claims are based on breach of contract or tort, or are initiated on any other basis in law or in equity whatsoever.

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Appendix 3: PM-1 Remedial Action Plan

Jacobs

Pointed Mountain Pipeline Abandonment Project

Remedial Action Plan
PM-1 Site, Kilometre Post 0.0, Northwest Territories

REM-0193, REM2018-034

FINAL

September 2023

Westcoast Energy Inc.

Jacobs

REM-0193, REM2018-034

Pointed Mountain Pipeline Abandonment Project

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Acronyms and Abbreviations

BC	British Columbia
BTEX	benzene, toluene, ethylbenzene, xylenes
CCME	Canadian Council of Ministers of the Environment
CER	Canada Energy Regulator
COC	contaminant of concern
COPC	contaminant of potential concern
ESA	Environmental Site Assessment
ETC	enhanced thermal conduction
F	fraction(s)
Guideline	Government of the Northwest Territories Environmental Guideline for Contaminated Site Remediation
km	kilometre(s)
KP	Kilometre Post
m	metre(s)
m^2	square metre(s)
m^3	cubic metre(s)
mbgs	metre(s) below ground surface
mg/kg	milligram(s) per kilogram
NPS	Nominal Pipe Size
NWT	Northwest Territories
PAH	polycyclic aromatic hydrocarbon
PHC	petroleum hydrocarbon
Project	Pointed Mountain Pipeline Abandonment Project
RAP	Remedial Action Plan
Site or PM-1 Site	the site area of aboveground infrastructure located at Kilometre Post 0.0
Westcoast	Westcoast Energy Inc.

1. Introduction

Westcoast Energy Inc. (Westcoast) retained Jacobs to provide a Remedial Action Plan (RAP) for the PM-1 Site (PM-1 Site or the Site), located at Kilometre Post (KP) 0.0 of the Pointed Mountain Pipeline in the Northwest Territories (NWT). Appended Figure 1 shows the alignment of the Pointed Mountain Pipeline through the NWT, Yukon, and British Columbia (BC).

The Pointed Mountain Pipeline is a deactivated Nominal Pipe Size (NPS) 20 gas gathering pipeline that is no longer connected to the Westcoast pipeline network and thus has no prospective future use. Westcoast is planning to abandon the Pointed Mountain Pipeline in 2023.

The RAP provides details for the remediation of the petroleum hydrocarbon (PHC)-contaminated soil at PM-1. The CER Reference number is REM-0193, REM2018-034.

The remedial activities described herein will be completed in conjunction with the Pointed Mountain Pipeline Abandonment Project (the Project).

2. PM-1 Site Background

This section provides background information about the Site, relevant to the remediation plan.

2.1 Site Description

The Pointed Mountain Pipeline, constructed in the early 1970s, is approximately 56 kilometres (km) in length, with the northernmost 31 km in the NWT, a central segment of 20 km in the Yukon, and the southernmost 5 km in BC. The pipeline has been deactivated for several years (KP 0.0 to KP 34.92 in 2008 and KP 34.92 to KP 55.64 in 2016), has been filled with nitrogen and connected to an active cathodic protection system to prevent corrosion (Westcoast 2020).

The buried pipeline has aboveground components described as follows. A key component of the Project is removal of this infrastructure at PM-1:

- NPS 24 pig launcher and catch basin
- Pipe supports (10)
- NPS 20 S-bend riser
- NPS 6 flare riser
- Flare stack control panel
- Aboveground diesel tanks (2), tubing, and support frames
- Aboveground propane tanks (4)
- NPS 4 aboveground flare piping, kicker piping, and associated valves and actuators
- NPS 20 aboveground piping and associated valves and actuators
- Building, platform, and stairs
- Cathodic protection
- NPS 20 risers and elbows and check valves on the piping to the producer plant (2)
- Nitrogen vent and valve on Pointed Mountain Pipeline

Site photographs are provided in Appendix A.

2.2 Physical Setting

The Phase II ESA (Jacobs 2022a) details the regional and local geology, local groundwater use, and Site topography and drainage and is considered a companion to this document. The conceptual site model in Appendix B summarizes the additional pertinent details about Site conditions that inform the RAP.

2.3 Investigative Summary

A Phase I ESA was completed in August 2021, the desktop portion of which identified areas of potential environment concern (APECs) at the Site, along with associated contaminants of potential concern (COPCs) (Jacobs 2022a). In addition to the Phase I ESA, two soil investigations were conducted at the PM-1 Site, namely:

1) A preliminary soil assessment in September 2020 to investigate the extent of a historical diesel release.
2) A Phase II ESA completed in August 2021 to further evaluate the extent of soil contamination identified at the Site in 2020.

To delineate the historical diesel impacts in soil as well as to assess additional APECs identified during the Phase I ESA (Jacobs 2022a), 23 boreholes were completed at the Site. Three surface soil samples were also collected in locations where deeper investigation was restricted by the presence of aboveground and underground infrastructure. These APECs are described in Exhibit 1.

Figure 2 presents the borehole and surface sample locations.

Exhibit 1. PM-1 APEC and COPC Summary

Identified APECs	COPCs
Former methanol AST (15,000-L)	Methanol
Two diesel ASTs, 8,620-L capacity	PHC F1-F4, BTEX, PAHs
Pig launcher, unidentified substance leaking from pig catch basin	PHC F1-F4, BTEX, PAHs
Generator building (location of 2018 diesel release)	PHC F1-F4, BTEX, PAHs
Former flare stack and pad	PHC F1-F4, BTEX, PAHs
Risers with associated valves and actuators. Hydraulic fluid observed leaking from the actuator system	PHC F1-F4, BTEX, PAHs
Areas of stressed vegetation, potentially associated with broadleaf control	Herbicides

AST = aboveground storage tank
BTEX = benzene, toluene, ethylbenzene, and xylene
COPC = contaminant of potential concern
F = fraction(s)
L = litres(s)

Tables 1 to 3 (appended to this document) present the results of the COPC analyses completed on soil samples collected during the two soil investigations. A comparison of analyte concentrations to the referenced guidelines established the following contaminants of concern (COCs) at the Site:

- BTEX
- PHC F1, F2, and F3
- PAHs (naphthalene, and phenanthrene)

2.4 Extent of Soil Contaminant Plume at the PM-1 Site

Figure 2 presents the locations of boreholes in which PHCs, BTEX, and PAHs were identified in soil at concentrations above applied guidelines. The interpolated areal extent of the soil contamination, determined using geostatistical three-dimensional kriging methods within C Tech Development Corporation's (C Tech) Earth Volumetric Studio (EVS) software, is also depicted.

Based on its prevalence, soil PHC F2 concentrations have been used in the estimation. The interpolation showed the contamination in two separate plumes, one associated with the historical diesel spill (approximately 390 square metres [m^2], impacts to approximately 3 metres below ground surface [mbgs]), the other associated with the pigging barrel (approximately 60 m^2 to 1 mbgs). The total estimated volume of PHC contaminated soil is 1,230 cubic metres (m^3).

3. Remedial Action Plan

The RAP outlined in this section describes the proposed activities to be conducted to remediate soil COCs.

3.1 Remediation Criteria

Remediation criteria presented in Exhibit 2 reflects the use of the most stringent Canadian Council of Ministers of the Environment (CCME) guidelines, regardless of grain size, and is inclusive of all human health and ecological exposure pathways.

Exhibit 2. Remediation Criteria

Contaminant of Concern	Numerical Guideline	Rationale for Selection	Guideline Source Document
Benzene	▪ 0.0068 mg/kg	Most conservative guideline (fine- or coarse-grained) available in CCME documentation	▪ Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Benzene (CCME 2004a)
Toluene	▪ 0.08 mg/kg	Most conservative guideline (fine- or coarse-grained) available in CCME documentation	▪ Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Toluene (CCME 2004b)
Ethylbenzene	▪ 0.018 mg/kg	Most conservative guideline (fine- or coarse-grained) available in CCME documentation	▪ Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Ethylbenzene (CCME 2004c)
Xylenes	▪ 2.4 mg/kg	Most conservative guideline (fine- or coarse-grained) available in CCME documentation	▪ Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Xylenes (CCME 2004d)
PHC F1	▪ 30 mg/kg	Most conservative guideline (fine- or coarse-grained) available in CCME and NWT documentation	▪ Canada-Wide Standard for Petroleum Hydrocarbons in Soil (CCME 2008)
PHC F2	▪ 150 mg/kg	Most conservative guideline (fine- or coarse-grained) available in CCME documentation	
PHC F3	▪ 300 mg/kg	Most conservative guideline available in CCME documentation (fine- or coarse-grained)	
Naphthalene	▪ 0.013 mg/kg	Most conservative guideline available in CCME documentation (not affected by grain size)	▪ Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Polycyclic Aromatic Hydrocarbons (CCME 2010)
Phenanthrene	▪ 0.046 mg/kg	Most conservative guideline available in CCME documentation (not affected by grain size)	▪ Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health Polycyclic Aromatic Hydrocarbons (CCME 2010)

mg/kg = milligram(s) per kilogram

Generic numerical soil guidelines provided within the Government of the NWT's *Environmental Guideline for Contaminated Site Remediation* (the Guideline) (Government of the NWT 2003) were adopted from the CCME guidelines and standards that were current at the time it was issued. Many of these guidelines and standards listed in the Guideline have been superseded. As such, the most current CCME guidelines and standards used herein are in concordance with the Guideline.

3.2 Rationale for Remedial Approach

The following points were considered when determining the preferred remedial option for the contaminated soil at the PM-1 Site, based on the Project schedule and preferences of the local Indigenous groups and other affected parties:

- Short remedy duration – treatment must be achievable within one field season. Preference was given to technologies that would not require long-term power requirements for operation and maintenance of equipment or facilities, for example.
- Established technology with a high success rate of treatment to the established guidelines.
- Seasonal flexibility (i.e., can be mobilized and operated in either summer or winter conditions).
- Ex situ, onsite treatment preferred due to the known volume of contaminated soil to be treated and the capability of treating additional volume, if encountered, in a cost-effective manner.
- Proven technology, capable of gaining regulatory approval as well as approval by local Indigenous groups, other stakeholders, and affected parties.

Based on the above criteria, Iron Creek Group's (Iron Creek's) patented ex situ enhanced thermal conduction (ETC) technology was chosen as the preferred remedial option.

3.3 Description of Remedial Method – Ex Situ Enhanced Thermal Conduction

ETC is a stationary technology that uses heat to volatilize soil COCs. The heat is generated via multi-fuel burners and distributed to the soil via three steel manifolds layered within the stockpiles. At the PM-1 Site, the contaminated soil will be excavated from the area shown on Figure 2 and placed in 400 cubic metre (m^3) stockpiles atop three stacked manifolds running the length of each pile. The manifolds each distribute heated air through a third of the stockpile via a series of steel pipes traversing its width. Prior to activating the burners, the stockpiled soil will be encased in a stainless-steel Quonset to entrap air containing volatile organic compounds (VOCs) during the soil treatment process. Injected air will be transferred to the soil to heat it to a temperature between 260 to 425 degrees Celsius (contaminant- and concentration-dependent) to volatilize the contaminant mass. The vapours generated from the treatment process, entrapped in the headspace of the Quonset, will be treated via thermal oxidizer to destroy the VOCs prior to release of the air to the atmosphere (Iron Creek 2022).

Following treatment, the soil will be allowed to cool to accommodate sampling and laboratory analysis to verify the soil COCs have been treated to concentrations below the remediation criteria. The treated soil will be placed back into the excavation, hydrated, and machine compacted.

Based on the estimated volume of contaminated soil at the Site (approximately 1,230 m^3), it is estimated that the soil will be treated in three batches over a 3- to 4-week period. The approximate footprint of the operation is 12 metres (m) by 48 m. The work will be staged within Westcoast's lease boundary such that a second 400-m^3 stockpile will be constructed, complete with air injection piping, while another is undergoing treatment. Once laboratory sampling has verified the treatment process, the Quonset will be moved from atop the treated soil and constructed on another untreated stockpile to restart the process.

3.3.1 Water Management

The clay in some boreholes was noted to be wet during the investigation. It is expected that this was perched water in gravel seams rather than groundwater, given the timing of the work (September 2020 and August 2021). There was no substantial water accumulation in the boreholes during the investigation; therefore, the likelihood of there being substantial water present in the excavation is similarly considered low.

3.3.2 Remedial Verification Sampling

The plume will be excavated to the approximate lateral and vertical extents shown on appended Figure 2, and with the assistance of the remediation contractor, Jacobs will collect soil samples from the excavation limits (i.e., the walls or base) to verify source removal. Given the lateral and vertical extent of the proposed excavation, an approximate sampling grid of 3 m horizontal by 1 m vertical is proposed for screening purposes.

A subset of these samples from a variety of depths along the sidewalls, as well as the excavation base, will be submitted for laboratory analysis of BTEX, PHC F1 to F4, and PAHs to confirm compliance with the remediation criteria presented in Subsection 3.1 prior to backfilling with the treated soil. Samples will be chosen for submission based on field screening of soil headspace vapour concentrations of PHCs and VOCs, subsurface soil stratigraphy, including major and minor soil types, colour, apparent moisture content, firmness, cohesiveness, inclusions, and indicators of apparent contamination. Samples will be submitted to an accredited laboratory on a rush turn-around-time basis, depending on the schedule of the pipeline abandonment activities. If contaminated soil is encountered beyond the current assumed extent of remediation, it will be included in the treatment volume.

The treated soil will be sampled at an approximate rate of one sample, composed of several aliquots per 50 m^3 of treated soil. Each sample will be formed from several aliquots within the allotted volume and submitted to an accredited laboratory to confirm the success of the treatment in achieving the remediation criteria.

3.3.3 Site Restoration

Following treatment and confirmatory sampling, the soil will be hydrated and placed back into the excavation footprint in approximate 200- to 300-millimetre lifts and compacted to grade level and left to naturally recover. Further details on planned restoration and post-construction monitoring are presented in the Environmental and Socio-Economic Assessment (Jacobs 2022b).

3.4 Contingency Plans and Performance Measures

The remediation will be conducted in conjunction with, and in the same location as, the remaining aboveground infrastructure at the Site that is to be decommissioned and demolished as part of the Project. The remedial activities are not expected to pose any additional risk to humans or ecological life in comparison to the pipeline abandonment activities.

Additional detail on proposed contingencies is provided in the following documents, which have been submitted to the Canada Energy Regulator (CER):

- Pointed Mountain Pipelines Abandonment Project Environmental and Socio-Economic Assessment (Jacobs 2020)
- Environmental Protection Plan Westcoast Energy Inc. Pointed Mountain Pipelines Abandonment Project (Enbridge 2020)

Performance measures to evaluate success of the remedial measures were outlined in Subsection 4.3.1.

3.5 Schedule

Remediation of the PM-1 Site is expected to occur in January or February 2025. Based on the projected volume of impacted soil at the PM-1 Site, the overall timeline for excavation, soil treatment, completion of confirmatory soil analyses, and backfilling is approximately 1 month.

3.6 Post-Remediation Activities

Because the remediation involves complete source treatment, no post-remediation monitoring is planned. The Site will be left to equilibrate to its natural surroundings following backfilling.

4. Engagement with Potentially Affected Persons

Westcoast has notified and consulted with the local government in the area (Member of the Northwest Territories Legislative Assembly, Member of Parliament, municipal representatives), Indigenous groups, surrounding landowners, and the Government of NWT, amongst others regarding the Project. All work outlined in this RAP will be limited to the PM-1 Site. The interpolated areal extent of the soil contamination is contained within Westcoast's lease boundary.

Consultation and engagement is active, ongoing and being managed by Westcoast under a separate process. As per the CER Remediation Process Guide (2020), a record of the engagement will be provided to CER.

5. Summary

This RAP describes the proposed activities to be conducted by Westcoast to remediate approximately 1,240 m^3 of PHC-, BTEX-, and PAH-impacted soil by onsite ex situ ETC. Groundwater or surface water will be managed as part of the remediation activities if encountered within the excavation.

6. Closure

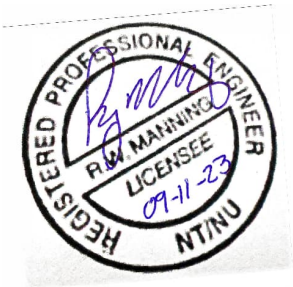
Jacobs has prepared this RAP for the exclusive use of Westcoast, using generally accepted scientific and technical practices and environmental guidelines, regulations, and criteria and standards in effect at the time of RAP preparation.

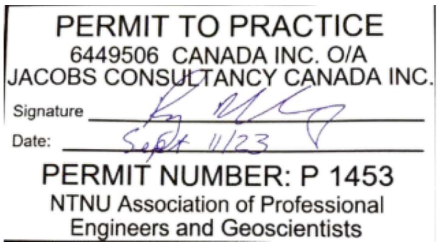
Use of the information provided in this report is subject to the Limitations detailed in Section 8.

Respectfully submitted,
Jacobs Consultancy Canada Inc.

Ryan Manning, P.Eng.
Senior Technical Consultant

Melissa Magnuson, P.Eng.
Project Manager





7. Limitations

In preparing this RAP, Jacobs may have relied, in whole or in part, on data and information provided by Westcoast and third-parties. Therefore, while Jacobs has used its best efforts in preparing this RAP, if the data, information, or statements supplied by Westcoast or third-parties is found to be incorrect or inaccurate, Jacobs' conclusions set forth in this RAP may change. No warranty, expressed or implied, is made.

Use of any RAP by third-parties will be limited to the same use as intended for Westcoast or to such related uses that could be reasonably foreseen by Jacobs at the time of RAP preparation, including disclosure to appropriate regulatory authorities with jurisdiction over the Site. Use of reports by third-parties in connection with sale, lease, financing, any other transfer of ownership transaction, or transfer of possession related to the Site is not contemplated by Jacobs and shall be subject to further agreement between Jacobs, Westcoast., and such third-party. Jacobs assumes no responsibility for conditions it was not authorized to investigate, or which were not in its specific scope of work.

Any use that a third-party makes of this RAP, or any reliance on or decisions made based on it, are the responsibility of such third-parties. Jacobs accepts no responsibility for damages, if any, suffered by any third-party because of decisions made or actions taken based on this RAP.

Any opinions or recommendations presented apply to Site conditions existing when services were performed. Jacobs cannot report on or accurately predict events that are not reasonably foreseeable. Such events may change the Site conditions after the described services are performed, whether occurring naturally or caused by external forces.

Where Jacobs provides both electronic file and hard copy versions of reports, drawings and other Project-related documents and deliverables, the signed and sealed hard copy or ConsignO encrypted electronic versions will be considered final and legally binding. The electronic reports and documents will be used only and exactly as submitted by Jacobs. Any corruption and change to the content and quality of the electronic reports and documents as a result of subsequent electronic re-transmission will be the sole responsibility of the party completing the re-transmission.

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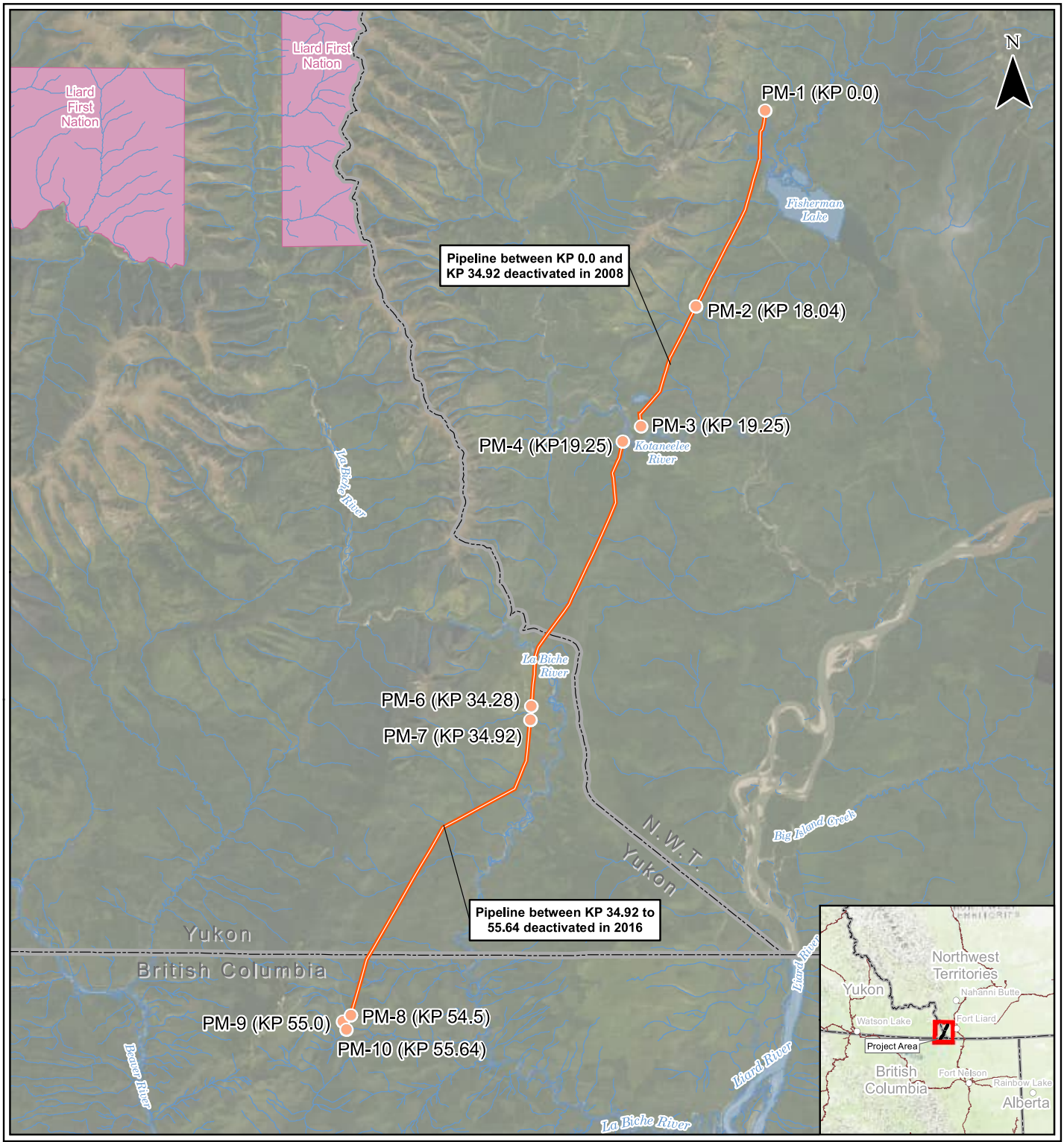
Figures



Site Location
Pointed Mountain Pipeline Route
Provincial Boundary
Watercourse
Water Body
First Nations (Interim Protected Lands)

FIGURE 1

PROJECT OVERVIEW
REMEDIAL ACTION PLAN
PM-1 SITE, NORTHWEST TERRITORIES

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

NAD 1983 UTM Zone 10N
Satellite Imagery: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.

SCALE: 1:275,000
0 5 10
Kilometres
(All Locations Approximate)

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May 2022

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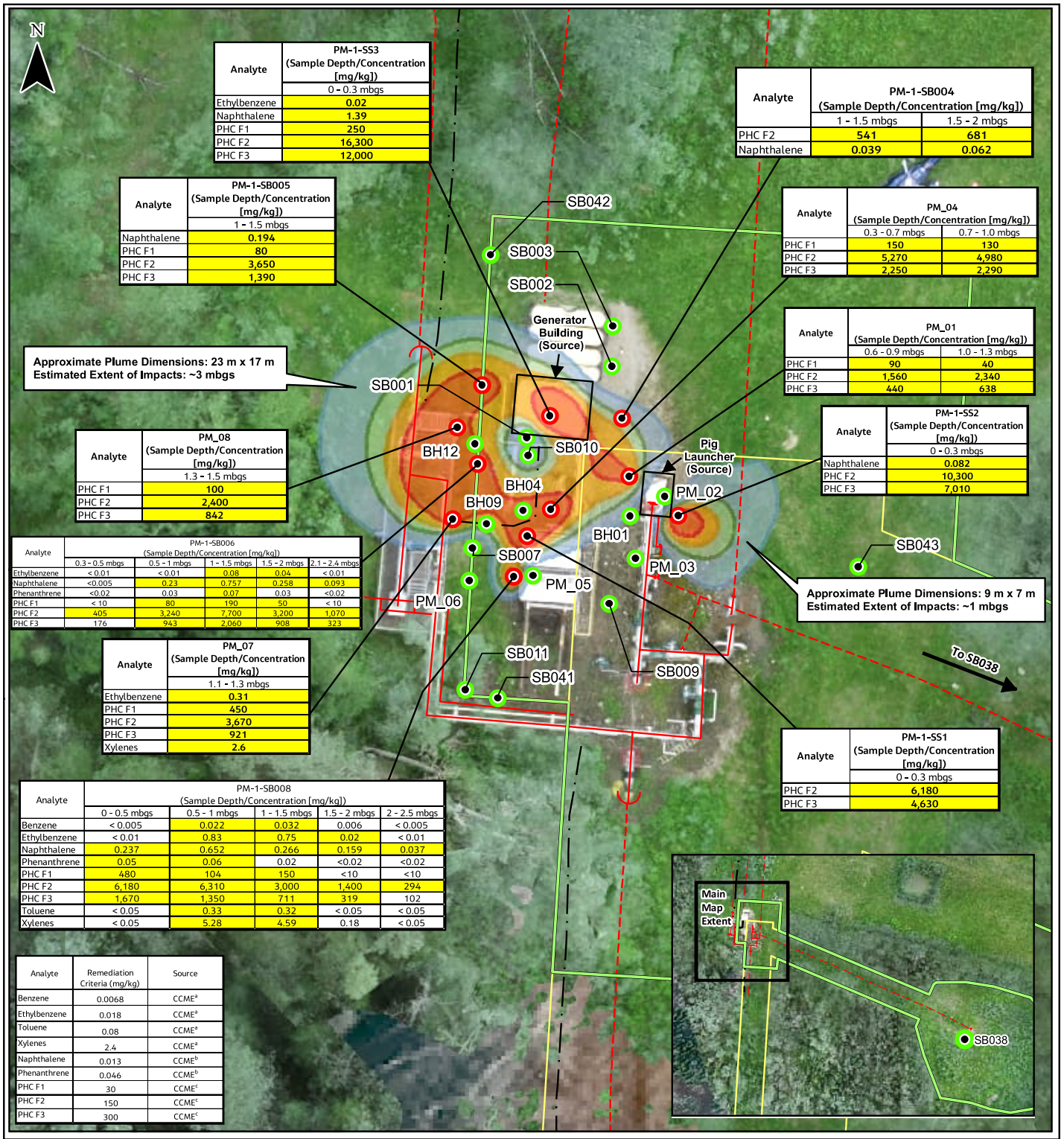

Analyte	PM-1-SS3 (Sample Depth/Concentration [mg/kg])
	0 - 0.3 mbgs
Ethylbenzene	0.02
Naphthalene	1.39
PHC F1	250
PHC F2	16,300
PHC F3	12,000

Analyte	PM-1-SB004 (Sample Depth/Concentration [mg/kg])	
	1 - 1.5 mbgs	1.5 - 2 mbgs
PHC F2	541	681
Naphthalene	0.039	0.062

Analyte	PM-1-SB005 (Sample Depth/Concentration [mg/kg])
	1 - 1.5 mbgs
Naphthalene	0.194
PHC F1	80
PHC F2	3,650
PHC F3	1,390

Analyte	PM_04 (Sample Depth/Concentration [mg/kg])	
	0.3 - 0.7 mbgs	0.7 - 1.0 mbgs
PHC F1	150	130
PHC F2	5,270	4,980
PHC F3	2,250	2,290

Analyte	PM_01 (Sample Depth/Concentration [mg/kg])	
	0.6 - 0.9 mbgs	1.0 - 1.3 mbgs
PHC F1	90	40
PHC F2	1,560	2,340
PHC F3	440	638

Analyte	PM_08 (Sample Depth/Concentration [mg/kg])
	1.3 - 1.5 mbgs
PHC F1	100
PHC F2	2,400
PHC F3	842

Analyte	PM-1-SS2 (Sample Depth/Concentration [mg/kg])
	0 - 0.3 mbgs
Naphthalene	0.082
PHC F2	10,300
PHC F3	7,010

Analyte	PM-1-SB006 (Sample Depth/Concentration [mg/kg])				
	0.3 - 0.5 mbgs	0.5 - 1 mbgs	1 - 1.5 mbgs	1.5 - 2 mbgs	2.1 - 2.4 mbgs
Ethylbenzene	< 0.01	< 0.01	0.08	0.04	< 0.01
Naphthalene	<0.005	0.23	0.757	0.258	0.093
Phenanthrene	<0.02	0.03	0.07	0.03	<0.02
PHC F1	< 10	80	190	50	< 10
PHC F2	405	3,240	7,700	3,200	1,070
PHC F3	176	943	2,060	908	323

Analyte	PM_07 (Sample Depth/Concentration [mg/kg])
	1.1 - 1.3 mbgs
Ethylbenzene	0.31
PHC F1	450
PHC F2	3,670
PHC F3	921
Xylenes	2.6

Analyte	PM-1-SS1 (Sample Depth/Concentration [mg/kg])
	0 - 0.3 mbgs
PHC F2	6,180
PHC F3	4,630

Analyte	PM-1-SB008 (Sample Depth/Concentration [mg/kg])				
	0 - 0.5 mbgs	0.5 - 1 mbgs	1 - 1.5 mbgs	1.5 - 2 mbgs	2 - 2.5 mbgs
Benzene	< 0.005	0.022	0.032	0.006	< 0.005
Ethylbenzene	< 0.01	0.83	0.75	0.02	< 0.01
Naphthalene	0.237	0.652	0.266	0.159	0.037
Phenanthrene	0.05	0.06	0.02	<0.02	<0.02
PHC F1	480	104	150	<10	<10
PHC F2	6,180	6,310	3,000	1,400	294
PHC F3	1,670	1,350	711	319	102
Toluene	< 0.05	0.33	0.32	< 0.05	< 0.05
Xylenes	< 0.05	5.28	4.59	0.18	< 0.05

Analyte	Remediation Criteria (mg/kg)	Source
Benzene	0.0068	CCME[a]
Ethylbenzene	0.018	CCME[a]
Toluene	0.08	CCME[a]
Xylenes	2.4	CCME[a]
Naphthalene	0.013	CCME[b]
Phenanthrene	0.046	CCME[b]
PHC F1	30	CCME[c]
PHC F2	150	CCME[c]
PHC F3	300	CCME[c]

- Borehole/Surface Sample Location
- Analyte Concentrations Less Than Applied Guidelines
- Analyte Concentrations Greater Than Applied Guidelines

- Westcoast Site Boundary
- Pipeline - Aboveground
- Pipeline - Underground
- Power - Underground
- Pointed Mountain Pipeline Right-of-Way

Soil PHC F2 Concentrations (mg/kg)
- 150 - 499
- 500 - 999
- 1000 - 1999
- >2000

Notes:
1. Tier 2 assessment completed. CCME guidelines chosen reflect the elimination of exposure pathways applicable to vapour inhalation and consumption of potable groundwater. Governing risks are via the ecological direct soil contact and freshwater aquatic life exposure pathways.
2. Plume extent has been estimated by statistical kriging using Earth Volumetric Studio (C Tech 2021).
3. CCME = Canadian Council of Ministers of the Environment
4. PHC = Petroleum hydrocarbon
5. Yellow highlight indicates value exceeds referenced guideline.
6. F = fraction, ILCR = incremental life cancer risk, mbgs = metre(s) below ground surface, mg/kg = milligram(s) per kilogram

FIGURE 2

SOIL ANALYTICAL RESULTS
REMEDIAL ACTION PLAN
PM-1 SITE, NORTHWEST TERRITORIES

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

NAD 1983 UTM Zone 10N

Notes: Satellite Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community; Roads: NRCan 2014-2015; Railway: NRCan 2012.
[a]Canadian Council of Ministers of the Environment (CCME). 2004. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Residential/parkland land use, most stringent of fine- and coarse-grained guidelines. ILCR of 10-5 applied for benzene.
[b]Canadian Council of Ministers of the Environment (CCME). 2010. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Polycyclic Aromatic Hydrocarbons. Residential/parkland land use.
[c]Canadian Council of Ministers of the Environment (CCME). 2008. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil. January. Residential/parkland land use, most stringent of fine- and coarse-grained guidelines.

SCALE: 1:350
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Metres
(All Locations Approximate)

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May 2022 | CE810500

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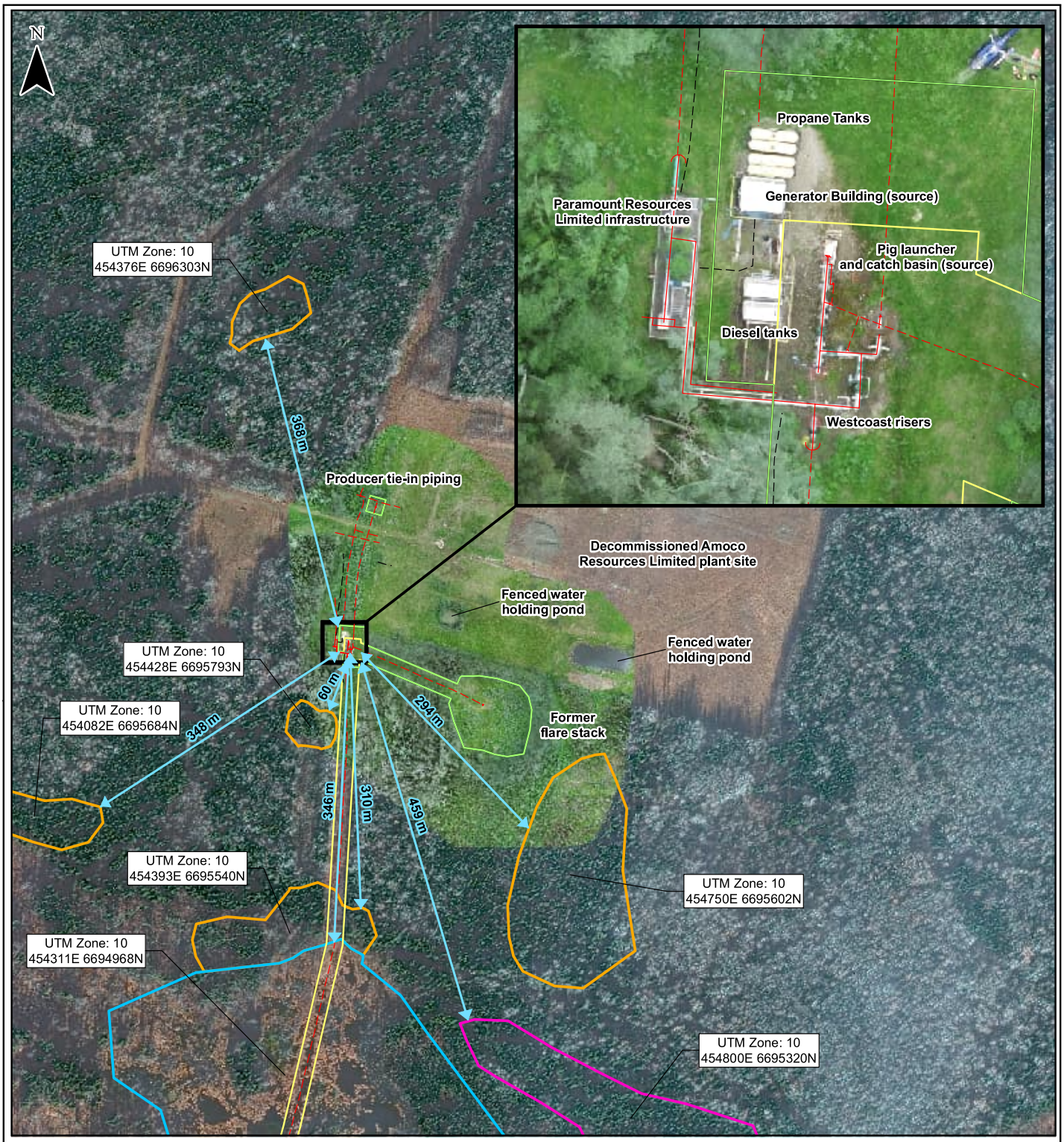

Underground Pipeline
Aboveground Pipeline
Underground Power
Pointed Mountain Pipeline Right-of-Way
Westcoast Site Boundary
Distance to Waterbody (m)

Wetlands
Fen
Shallow Water
Swamp

FIGURE 3

RECEPTOR OVERVIEW
REMEDIAL ACTION PLAN
PM-1 SITE, NORTHWEST TERRITORIES

WESTCOAST ENERGY INC.
POINTED MOUNTAIN PIPELINE ABANDONMENT PROJECT

NAD 1983 UTM Zone 10N
Satellite Imagery: ; Roads: NRCan 2014-2015; Railway: NRCan 2012; Wetlands: Jacobs 2021.

SCALE: 1:6,500
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Metres
(All Locations Approximate)

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

May 2022 | CE810600

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Tables

Table 1. Soil Analytical Results - Petroleum Hydrocarbons

Remedial Action Plan, PM-1 Site, Kilometre Post 0.0, Northwest Territories

Sample ID	Sample Date (DD-MMM-YY)	Sample Depth mbgs	Combustible Hydrocarbons ppm_v	Volatile Organic Compounds ppm_v	Benzene mg/kg	Toluene mg/kg	Ethylbenzene mg/kg	Xylenes, Total mg/kg	PHC F1 mg/kg	PHC F1-BTEX mg/kg	PHC F2 mg/kg	PHC F3 mg/kg	PHC F4 mg/kg	Moisture Content %
				CCME [a,b]	0.0068	0.08	0.018	2.4	NG	30	150	300	2800	NG
September 2020														
PM_01_SOa	20-Sep-20	0.0 - 0.3	100	2	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	29	16	25
PM_01_SOb	20-Sep-20	0.6 - 0.9	130	18	<0.005	<0.05	<0.01	0.05	90	90	1560	440	44	24
PM_01_SOc	20-Sep-20	1.0 - 1.3	300	280	<0.005	<0.05	<0.01	<0.05	40	40	2340	638	44	23
PM_02_SOa	20-Sep-20	0.5 - 0.8	135	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	23	10	15
PM_03_SOa	20-Sep-20	0.3 - 0.5	40	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	64	26	20
PM_03_SOb	20-Sep-20	1.0 - 1.2	60	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	28	13	23
PM_04_SOa	20-Sep-20	0.3 - 0.7	190	38	<0.005	<0.05	<0.01	<0.05	150	150	5270	2250	353	21
PM_04_SOb	20-Sep-20	0.7 - 1.0	55	26	<0.005	<0.05	0.04	0.11	130	130	4980	2290	423	22
PM_05_SOa	20-Sep-20	0.5 - 0.8	25	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	29	17	26
PM_05_SOb	20-Sep-20	1.0 - 1.2	145	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	79	37	24
PM_06_SOb	20-Sep-20	1.1 - 1.3	180	18	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	36	20	21
PM_07_SOa	20-Sep-20	1.1 - 1.3	0	26	<0.005	<0.05	0.31	2.6	450	450	3670	921	34	21
PM_08_SOa	20-Sep-20	0.7 - 1.0	60	0	<0.005	<0.05	<0.01	<0.05	<10	<10	<10	29	16	24
PM_08_SOb	20-Sep-20	1.3 - 1.5	130	26	<0.005	<0.05	<0.01	0.11	100	100	2400	842	93	22
August 2021														
PM-1-SB001A	17-Aug-21	0.1 - 0.5	60	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	46	20	22
PM-1-SB001B	17-Aug-21	0.5 - 1.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	48	20	21
PM-1-SB001C	17-Aug-21	1.0 - 1.5	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	53	22	23
PM-1-SB001D	17-Aug-21	1.5 - 1.8	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	33	12	15
PM-1-SB002A	17-Aug-21	0.1 - 0.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	35	18	21
PM-1-SB002B	17-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	49	20	17
PM-1-SB002C	17-Aug-21	1.0 - 1.5	60	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	35	12	22
PM-1-SB002D	17-Aug-21	1.9 - 1.9	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	41	13	16
PM-1-SB003A	17-Aug-21	0.3 - 0.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	209	55	21
PM-1-SB003B	17-Aug-21	0.5 - 1.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	38	16	25
PM-1-SB003C	17-Aug-21	1.0 - 1.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	43	18	19
PM-1-SB003D	17-Aug-21	1.5 - 2.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	39	14	18
PM-1-SB004A	17-Aug-21	0.1 - 0.5	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	26	< 10	21
PM-1-SB004B	17-Aug-21	0.5 - 1.0	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	45	21	22
PM-1-SB004C	17-Aug-21	1.0 - 1.5	15	--	< 0.005	< 0.05	< 0.01	< 0.05	20	20	541	186	21	21
PM-1-SB004D	17-Aug-21	1.5 - 2.0	15	--	< 0.005	< 0.05	< 0.01	< 0.05	10	10	681	225	22	21
PM-1-SB004E	17-Aug-21	2.0 - 2.5	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	35	11	12
PM-1-SB004F	17-Aug-21	2.5 - 3.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	29	< 10	10
PM-1-SB005A	17-Aug-21	0.1 - 0.5	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	26	14	23
PM-1-SB005B	17-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	41	16	24
PM-1-SB005C	17-Aug-21	1.0 - 1.5	5	--	< 0.005	< 0.05	< 0.01	< 0.05	80	80	3650	1390	163	21
PM-1-SB005D	17-Aug-21	1.5 - 2.0	30	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	88	94	33	23
PM-1-SB005E	17-Aug-21	2.0 - 2.5	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	57	68	23	13
PM-1-SB006A	17-Aug-21	0.3 - 0.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	405	176	21	26
PM-1-SB006B	18-Aug-21	0.5 - 1.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	80	80	3240	943	39	24
PM-1-SB006C	18-Aug-21	1.0 - 1.5	40	--	< 0.005	< 0.05	0.08	0.14	190	190	7700	2060	52	22
PM-1-SB006D	18-Aug-21	1.5 - 2.0	60	--	< 0.005	< 0.05	0.04	0.34	50	50	3200	908	41	23
PM-1-SB006E	18-Aug-21	2.1 - 2.4	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	1070	323	22	14
PM-1-SB007A	18-Aug-21	0.1 - 0.4	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	12	22	< 10	16
PM-1-SB007B	18-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	11	52	24	24
PM-1-SB007C	18-Aug-21	1.0 - 1.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	13	64	34	22
PM-1-SB007D	18-Aug-21	1.5 - 2.0	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	39	15	22
PM-1-SB007E	18-Aug-21	2.0 - 2.5	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	12	41	14	12
PM-1-SB008A	18-Aug-21	0.0 - 0.5	140	--	< 0.005	< 0.05	< 0.01	< 0.05	480	480	6180	1670	20	20
PM-1-SB008B	18-Aug-21	0.5 - 1.0	80	--	0.022	0.33	0.83	5.28	110	104	6310	1350	26	21
DUP-3-0821	18-Aug-21	0.5 - 1.0	--	--	0.01	0.25	0.61	3.88	93	88	7610	1650	22	19
RPD				--	NC	28%	31%	31%	17%	17%	19%	20%	NC	10%
PM-1-SB008C	18-Aug-21	1.0 - 1.5	40	--	0.032	0.32	0.75	4.59	156	150	3000	711	40	21
PM-1-SB008D	18-Aug-21	1.5 - 2.0	120	--	0.006	< 0.05	0.02	0.18	< 10	< 10	1400	319	< 10	22
PM-1-SB008E	18-Aug-21	2.0 - 2.5	30	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	294	102	11	12
DUP-4-0821	18-Aug-21	2.0 - 2.5	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	311	101	< 10	13
RPD				--	NC	NC	NC	NC	NC	NC	6%	1%	NC	8%
PM-1-SB009A	18-Aug-21	0.2 - 0.5	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	31	< 10	20
PM-1-SB009B	18-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	< 10	< 10	19
PM-1-SB009C	18-Aug-21	1.0 - 1.5	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	42	19	23
DUP-6-0821	18-Aug-21	1.0 - 1.5	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	33	18	23
RPD				--	NC	NC	NC	NC	NC	NC	NC	24%	5%	0%
PM-1-SB010A	21-Aug-21	0.0 - 0.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	28	72	28	22
PM-1-SB010B	21-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	80	32	22
DUP-7-0821	21-Aug-21	0.5 - 1.0	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	75	34	22
RPD				--	NC	NC	NC	NC	NC	NC	NC	6%	6%	0%
PM-1-SB010C	21-Aug-21	1.0 - 1.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	58	23	23
PM-1-SB010D	21-Aug-21	1.5 - 2.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	33	13	12
DUP-2-0821	18-Aug-21	1.5 - 2.0	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	42	14	21
RPD				--	NC	NC	NC	NC	NC	NC	NC	24%	7%	55%
PM-1-SB011A	18-Aug-21	0.3 - 0.5	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	38	23	20
PM-1-SB011B	18-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	56	26	18
DUP-1-0821	18-Aug-21	0.5 - 1.0	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	33	19	23

Table 1. Soil Analytical Results - Petroleum Hydrocarbons

Remedial Action Plan, PM-1 Site, Kilometre Post 0.0, Northwest Territories

Sample ID	Sample Date (DD-MMM-YY)	Sample Depth	Combustible Hydrocarbons	Volatile Organic Compounds	Benzene	Toluene	Ethylbenzene	Xylenes, Total	PHC F1	PHC F1-BTEX	PHC F2	PHC F3	PHC F4	Moisture Content
		mbgs	ppm_v	ppm_v	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
RPD			--	--	NC	NC	NC	NC	NC	NC	NC	52%	31%	24%
PM-1-SB011C	18-Aug-21	1.0 - 1.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**57**	**32**	20
PM-1-SB011D	18-Aug-21	1.5 - 2.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**55**	**33**	20
PM-1-SB038A	21-Aug-21	0.0 - 0.2	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**41**	**18**	19
PM-1-SB038B	21-Aug-21	0.5 - 1.0	5	--	< 0.005	**0.06**	< 0.01	< 0.05	< 10	< 10	< 10	**32**	**16**	25
PM-1-SB038C	21-Aug-21	1.0 - 1.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**38**	**15**	15
PM-1-SB041A	18-Aug-21	0.1 - 0.5	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**34**	< 10	17
PM-1-SB041B	18-Aug-21	0.5 - 1.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	< 10	< 10	21
PM-1-SB041C	18-Aug-21	1.0 - 1.5	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**24**	**10**	21
PM-1-SB041D	18-Aug-21	1.5 - 2.0	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**29**	**14**	21
DUP-5-0821	18-Aug-21	1.5 - 2.0	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**20**	**11**	19
RPD			--	--	NC	NC	NC	NC	NC	NC	NC	37%	24%	NC
PM-1-SB042A	21-Aug-21	0.0 - 0.2	5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**32**	**16**	20
PM-1-SB042B	21-Aug-21	0.8 - 1.0	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**35**	**19**	14
PM-1-SB042C	21-Aug-21	1.0 - 1.5	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**33**	**16**	21
PM-1-SB042D	21-Aug-21	1.5 - 2.0	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**48**	**21**	22
PM-1-SB042E	21-Aug-21	2.0 - 2.5	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**37**	**16**	22
PM-1-SB043A	21-Aug-21	0.1 - 0.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**87**	**44**	19
DUP-8-0821	21-Aug-21	0.1 - 0.5	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**59**	**33**	21
RPD			--	--	NC	NC	NC	NC	NC	NC	NC	38%	29%	10%
PM-1-SB043B	21-Aug-21	0.5 - 1.0	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**45**	**21**	21
PM-1-SB043C	21-Aug-21	1.0 - 1.5	< 5	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	**66**	**29**	22
PM-1-SS1	21-Aug-21	0.0 - 0.3	10	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	**6180**	**4630**	**47**	43
PM-1-SS2	21-Aug-21	0.0 - 0.3	15	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	**10300**	**7010**	**164**	21
PM-1-SS3	21-Aug-21	0.0 - 0.3	50	--	< 0.005	< 0.05	**0.02**	**1.32**	**250**	**250**	**16300**	**12000**	**164**	26
TB-1 Soil	21-Aug-18	--	--	--	< 0.005	< 0.05	< 0.01	< 0.05	< 10	< 10	< 10	< 10	< 10	<1

[a] Canadian Council of Ministers of the Environment (CCME). 2004. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health. Residential/parkland land use, most stringent of fine- and coarse-grained guidelines. ILCR of 10^{-5} applied for benzene.

[b] Canadian Council of Ministers of the Environment (CCME). 2008. Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil. January. Residential/parkland land use, most stringent of fine- and coarse-grained guidelines.

Notes:
-- = not measured
Grey highlight indicates value exceeds referenced guideline.
Bold indicates the analyte was detected
BTEX = benzene, toluene, ethylbenzene, and xylenes
F = fraction
ILCR = incremental life cancer risk
mbgs = metre(s) below ground surface
mg/kg = milligram(s) per kilogram
NC = RPD could not be calculated as one or more results was less than, or within 5 times, the detection limit
NG = no guideline
ppm_v = parts per million by volume
RPD = relative percentage difference calculated using:

$$RPD\% = \frac{|S - D|}{\frac{1}{2}(S + D)} \times 100\%$$

Where:
S = Sample value
D = Duplicate or replicate value

Table 2. Soil Analytical Results - Polycyclic Aromatic Hydrocarbons
Remedial Action Plan, PM-1 Site, Kilometre Post 0.0, Northwest Territories

Sample ID	Sample Date	Sample Depth	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Acridine	Anthracene	BaP TPE	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b+j]fluoranthene	Benzo[ghi]perylene	Benzo[k]fluoranthene	Chrysene	Dibenzo[ah]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	IACR - Coarse	IACR - Fine
		mbgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	NA	NA
		CCME[a]	NG	0.28	320	NG	2.5	5.3	1	0.6	1	NG	1	6.2	1	15.4	0.25	1	0.013	0.046	7.7	NG	1	1
PM-1-SB001A	17-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB001B	17-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB001C	17-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB001D	17-Aug-21	1.5 - 1.8	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB002A	17-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB002B	17-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB002C	17-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB002D	17-Aug-21	1.9 - 1.9	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB003A	17-Aug-21	0.3 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB003B	17-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB003C	17-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB003D	17-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB004A	17-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB004B	17-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB004C	17-Aug-21	1.0 - 1.5	**0.016**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**0.039**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB004D	17-Aug-21	1.5 - 2.0	**0.048**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**0.062**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB004E	17-Aug-21	2.0 - 2.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB004F	17-Aug-21	2.5 - 3.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB005A	17-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB005B	17-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB005C	17-Aug-21	1.0 - 1.5	**0.156**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.06**	< 0.02	**0.194**	**0.03**	**0.01**	< 0.05	0.0136	0.0259
PM-1-SB005D	17-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**0.007**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB005E	17-Aug-21	2.0 - 2.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB006A	17-Aug-21	0.3 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB006B	18-Aug-21	0.5 - 1.0	**0.038**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.05**	< 0.02	**0.23**	**0.03**	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB006C	18-Aug-21	1.0 - 1.5	**0.813**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.13**	< 0.02	**0.757**	**0.07**	**0.02**	< 0.05	0.0136	0.0259
PM-1-SB006D	18-Aug-21	1.5 - 2.0	**0.306**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.05**	< 0.02	**0.258**	**0.03**	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB006E	18-Aug-21	2.1 - 2.4	**0.107**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.02**	< 0.02	**0.093**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB007A	18-Aug-21	0.1 - 0.4	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB007B	18-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB007C	18-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB007D	18-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB007E	18-Aug-21	2.0 - 2.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB008A	18-Aug-21	0.0 - 0.5	**0.018**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.08**	< 0.02	**0.237**	**0.05**	**0.02**	< 0.05	0.0136	0.0259
PM-1-SB008B	18-Aug-21	0.5 - 1.0	**0.733**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	**0.09**	< 0.02	**0.652**	**0.06**	**0.02**	< 0.05	0.0136	0.0259
DUP-3-0821	18-Aug-21	0.5 - 1.0	**0.629**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	0.11	< 0.02	**0.618**	**0.06**	**0.02**	< 0.05	0.0136	0.0259
RPD	-	-	15%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	20%	NC	5%	NC	NC	NC	NC	NC
PM-1-SB008C	18-Aug-21	1.0 - 1.5	**0.292**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	0.04	< 0.02	**0.266**	**0.02**	**0.01**	< 0.05	0.0136	0.0259
PM-1-SB008D	18-Aug-21	1.5 - 2.0	**0.204**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	0.03	< 0.02	**0.159**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB008E	18-Aug-21	2.0 - 2.5	**0.038**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**0.037**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-4-0821	18-Aug-21	2.0 - 2.5	**0.046**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**0.033**	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	19%	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	11%	NC	NC	NC	NC	NC
PM-1-SB009A	18-Aug-21	0.2 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB009B	18-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB009C	18-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-6-0821	18-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
PM-1-SB010A	21-Aug-21	0.0 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB010B	21-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-7-0821	21-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
PM-1-SB010C	21-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB010D	21-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB011A	18-Aug-21	0.3 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB011B	18-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-1-0821	18-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
PM-1-SB011C	18-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB011D	18-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-2-0821	18-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
PM-1-SB038A	21-Aug-21	0.0 - 0.2	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB038B	21-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB038C	21-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB041A	18-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB041B	18-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB041C	18-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB041D	18-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-5-0821	18-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
PM-1-SB042A	21-Aug-21	0.0 - 0.2	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259

Table 2. Soil Analytical Results - Polycyclic Aromatic Hydrocarbons
Remedial Action Plan, PM-1 Site, Kilometre Post 0.0, Northwest Territories

Sample ID	Sample Date	Sample Depth	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Acridine	Anthracene	BaP TPE	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b+j]fluoranthene	Benzo[ghi]perylene	Benzo[k]fluoranthene	Chrysene	Dibenzo[ah]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	Naphthalene	Phenanthrene	Pyrene	Quinoline	IACR - Coarse	IACR - Fine
		mbgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	NA	NA
PM-1-SB042B	21-Aug-21	0.8 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB042C	21-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB042D	21-Aug-21	1.5 - 2.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB042E	21-Aug-21	2.0 - 2.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB043A	21-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
DUP-8-0821	21-Aug-21	0.1 - 0.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
RPD	-	-	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
PM-1-SB043B	21-Aug-21	0.5 - 1.0	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SB043C	21-Aug-21	1.0 - 1.5	< 0.005	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	< 0.01	< 0.05	0.0136	0.0259
PM-1-SS1	21-Aug-21	0.0 - 0.3	**0.007**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	< 0.005	< 0.02	**0.03**	< 0.05	0.0136	0.0259
PM-1-SS2	21-Aug-21	0.0 - 0.3	**0.038**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**0.082**	< 0.02	**0.05**	< 0.05	0.0136	0.0259
PM-1-SS3	21-Aug-21	0.0 - 0.3	**1.31**	< 0.005	< 0.005	< 0.05	< 0.004	0.0225	< 0.02	< 0.03	< 0.03	< 0.05	< 0.02	< 0.05	< 0.005	< 0.01	< 0.01	< 0.02	**1.39**	< 0.02	**0.06**	< 0.05	0.0136	0.0259

[a] Canadian Council of Ministers of the Environment (CCME). 2010. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Polycyclic Aromatic Hydrocarbons. Residential/parkland land use.

Notes:
Grey highlight indicates value exceeds referenced guideline.
Bolding indicates the analyte was detected
mbgs = metre(s) below ground surface
mg/kg = milligram(s) per kilogram
NG = no guideline
NC = RPD could not be calculated as one or more results was less than, or within five times, the detection limit
B[a]P TPE = benzo[a]pyrene total potency equivalents
RPD = relative percentage difference calculated using:

$$RPD\% = \frac{|S - D|}{\frac{1}{2}(S + D)} \times 100\%$$

Where:
S = Sample value
D = Duplicate or replicate value

Table 3. Soil Analytical Results - Herbicides and Organic Halides

Remedial Action Plan, PM-1 Site, Kilometre Post 0.0, Northwest Territories

Sample ID	Sample Date	Sample Depth	Atrazine	Bromacil	Diuron	Linuron	Simazine	Tebuthiuron	Extractable Organic Halides	Glyphosate
		mbgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
		CCME	NG	NG	NG	NG	NG	NG	NG	NG
PM-1-SS1	21-Aug-21	0.0 - 0.3	<0.0081R	**0.247 J**	**0.06 J**	<0.045R	<0.028R	<0.041R	<5R	**0.22 J**
PM-1-SS2	21-Aug-21	0.0 - 0.3	<0.0081R	**0.0821 J**	**0.05 J**	<0.045R	<0.028R	<0.041R	<5R	**0.06 J**
PM-1-SS3	21-Aug-21	0.0 - 0.3	**0.322 J**	**0.128 J**	**0.51 J**	<0.045R	<0.028R	<0.041R	<5R	<0.03R

Notes:
Bold indicates the anayte was detected
mbgs = metre(s) below ground surface
mg/kg = milligram(s) per kilogram
NG = no guideline
R = The sample result was rejected because of deficiencies in the ability to analyze the sample and meet the quality control criteria. The presence or absence of the analyte could not be verified. Data qualified "R" were not used in the decision-making process.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Table 4. Soil Analytical Results - Particle Size Analysis

Remedial Action Plan, PM-1 Site, Kilometre Post 0.0, Northwest Territories

Sample ID	Sample Date (DD-MMM-YY)	Sample Depth mbgs	Sieve Analysis (75 microns) % Retained	Sieve Texture
PM_03_SOa	20-Sep-20	0.3 - 0.5	28	Fine
PM_07_SOa	20-Sep-20	1.1 - 1.3	19	Fine
PM-1-SB004C	17-Aug-21	1.0 - 1.5	13	Fine

Note:
mbgs = metre(s) below ground surface

Appendix A
Photograph Log for Site PM-1

Appendix A. Photograph Log for PM-1 Site

Photograph 1: Aerial view of former Amoco Gas Plant site north of the PM-1 aboveground infrastructure, facing southeast.

Photograph 2: Facing southwest towards aboveground infrastructure at PM-1.

Photograph 3: Facing northwest towards aboveground infrastructure at PM-1. Tall riser on the left side of the photograph owned by Paramount Resources Ltd.

Photograph 4: Facing south towards aboveground infrastructure at PM-1. Tall riser in the background is owned by Paramount Resources Ltd.

Photograph 5: Facing southeast towards diesel aboveground storage tanks on platforms.

Photograph 6: Elevated diesel aboveground storage tanks. Facing southeast. Tall riser on the right side of the photograph owned by Paramount Resources Ltd.

Photograph 7: Flare stack surrounded by metal guard in cleared area east of PM-1 infrastructure.

Appendix B
Conceptual Site Model

Appendix C. Detailed Phase II ESA Summary

Exhibit B-1. Revised Conceptual Site Model

Category	Subcategory	Description	Result
Site Characteristics			
Land use	Onsite	Current: Industrial Future: Naturalized area	Guidelines for most conservative land use carried forward: CCME – residential/parkland
	Offsite (within 30 m of Site boundary)	The PM-1 Site is surrounded by a mix of oil and gas industrial land use and natural forested land in all directions.	
Site conditions	Soil stratigraphy	Results from boreholes advanced in the area around PM-1 indicate the subsoil to be predominantly silty clay or clay to full depth of investigation. Sand, gravel, or fill was observed near surface (up to 0.75 mbgs) in 15 boreholes. A layer of sand and gravel at 2.0 to 2.5 mbgs (auger refusal) was encountered in PM-1-SB005 on the west side of the Site.	Due to the presence of both fine- and coarse-grained constituents and the lack of geotechnical data, the most stringent of the CCME's guidelines were selected, without consideration of grain size.
	Grain size	Three particle size analysis tests were completed from boreholes PM_03, PM_07, and PM-1-SB004 which indicated the soil to be fine-grained (see Table 4).	
Other	Local hydrogeology – depth to groundwater, groundwater flow direction, hydraulic conductivity	Unknown; no monitoring wells were installed during investigation.	
	Preferential pathways – underground facilities, pipelines	The Pointed Mountain Pipeline exits the south end of Westcoast's lease from the pigging barrel. A tie-in pipeline enters the Site from the north and a flare line exits the Site to the southeast. Paramount operates underground infrastructure immediately west of the PM-1 Site (pipeline and buried powerline connects to the infrastructure from the north). A buried power line is present between the generator building and exits the Site to the west (toward the Paramount infrastructure).	
Groundwater use	Onsite	None	
	Offsite (within 500 m)	None	

Exhibit B-1. Revised Conceptual Site Model

Category	Subcategory	Description	Result
Surface Water	Drainage	The Site is poorly drained.	
	Onsite	None	
	Offsite (within 500 m)	A treed swamp is located approximately 60 m south of the Site. A shallow surface waterbody was observed approximately 346 m south of the Site. Another swamp is located approximately 294 m southeast of the Site. A third swamp is located approximately 310 m south of the Site, and a fourth is located approximately 348 m southwest of the Site. A fen is located approximately 459 m south of southeast of the Site. Additionally, two ponds were observed during the Phase I ESA approximately 130 m and 280 m northeast of the PM-1 infrastructure. The ponds were suspected to be septic and process water holding ponds associated with the former gas plant infrastructure and were observed to be fenced and covered. As such, they are unlikely to support aquatic life, and are not considered potential receptors.	
Exposure Assessment			
Human Health Pathways	Soil ingestion	Intake of contaminated soil is considered in the CCME residential/parkland guidelines.	Included in assessment
	Soil dermal contact	Dermal contact is considered in the CCME residential/parkland guidelines.	Included in assessment
	Vapour inhalation (indoor air)	Human health risks via the vapour inhalation pathway were considered, as the future land use at this Site is unknown.	Included in assessment
	Protection of potable groundwater	Though no domestic water wells were identified during a records search of the area around the PM-1 Site, future land use is unknown and groundwater supplies are present.	Included in assessment

Exhibit B-1. Revised Conceptual Site Model

Category	Subcategory	Description	Result
Ecological Health Pathways	Direct Soil Contact	CCME allows exclusion of this pathway for PHC F1 to F4 below certain depths, normally between 1.5 and 3.0 mbgs. Based on the shallow depth of investigation, this pathway is applicable.	Included in assessment
	Nutrient Energy Cycling	Not applicable to any of the COPCs.	
	Protection of Groundwater for Aquatic Life	CCME freshwater aquatic life guidelines consider potential receptors within 300 m of a soil plume. This pathway cannot be excluded due to the wetland located less than 100 m south of the Site.	Included in assessment
	Management Limit	Applicable to PHC F1 to F4 in soil under the CCME frameworks at depths at which the ecological direct soil contact pathway is eliminated.	Excluded from assessment; the ecological direct soil contact is applicable to the full depth of contamination.

Sources:

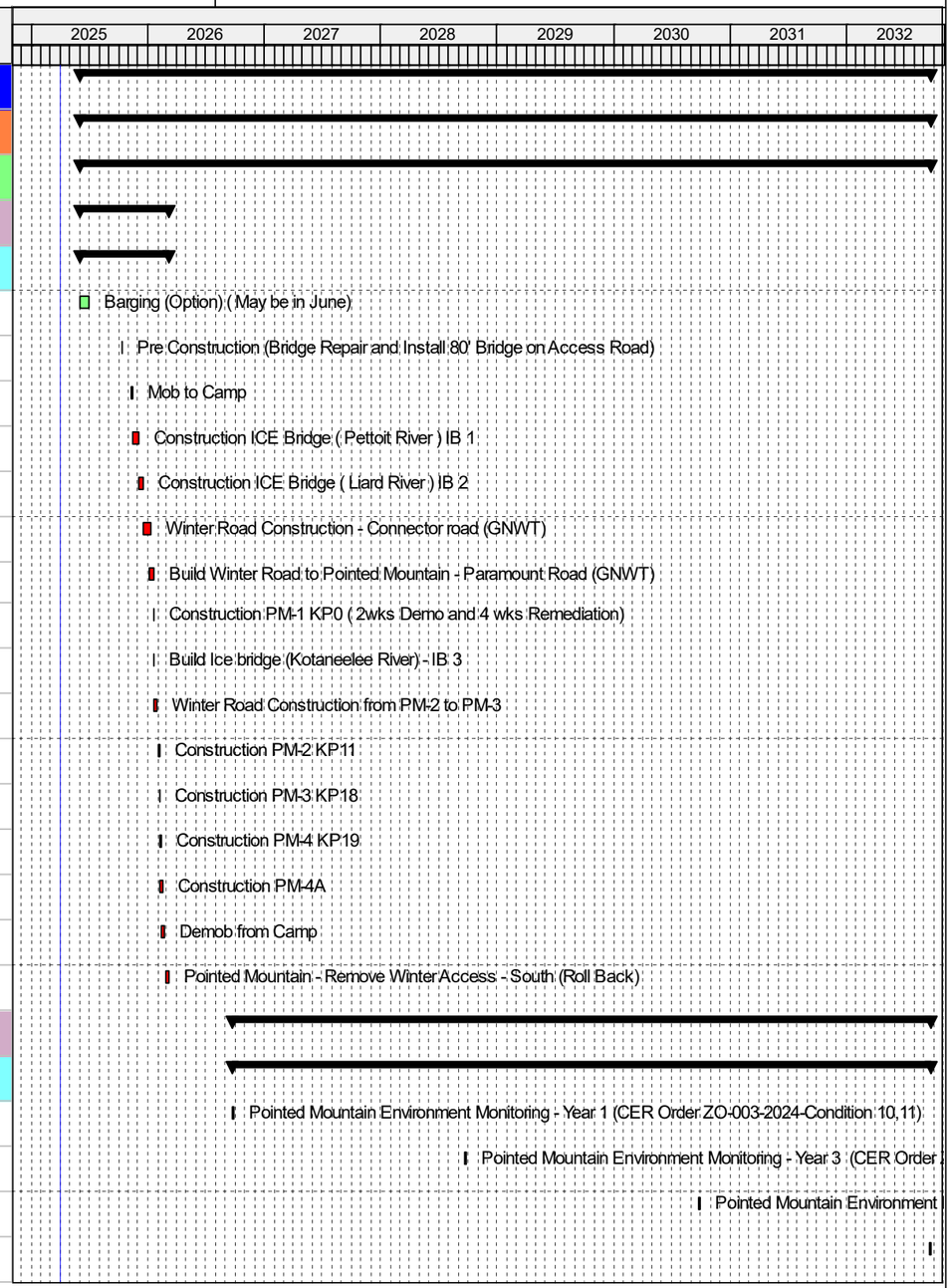
Canadian Council of Ministers of the Environment (CCME). 2008. *Canada-Wide Standard for Petroleum Hydrocarbons (PHC) in Soil: Scientific Rationale*. January. CWS for PHCs in Soil: Scientific Rationale - Supporting Technical Document (mvlwb.ca).

m = metre(s)
mbgs = metre(s) below ground surface
CCME = Canadian Council of Ministers of the Environment
COPC = contaminant of potential concern
ESA = Environmental Site Assessment
F = fraction
Paramount = Paramount Resources Ltd.
PHC = petroleum hydrocarbon

Appendix 4: Gantt Chart

Q1198 Pointed Mountain Abandonment | **Estimated dates of Closure and Abandonment Activities*** | 17-Apr-25

Activity ID	Activity Name	Start	Finish
Q1198 Pointed Mountain Abandonment		02-Jun-25	24-Sep-32
Q1198.2 Level 2 Summary Schedule		02-Jun-25	24-Sep-32
Q1198.2.2 Project Execution		02-Jun-25	24-Sep-32
Q1198.2.2.5 Construction		02-Jun-25	10-Mar-26
Q1198.2.2.5.11 Pointed Mountain -North Construction (KP0.0 to KP19.3)		02-Jun-25	10-Mar-26
RGT-CNPM2506	Barging (Option) (May be in June)	02-Jun-25	30-Jun-25
RGT-CNPM2420	Pre Construction (Bridge Repair and Install 80' Bridge on Access Road)	10-Oct-25	10-Oct-25
RGT-CNPM1240	Mob to Camp	10-Nov-25	14-Nov-25
RGT-CNPM2370	Construction ICE Bridge (Pettoit River) IB 1	14-Nov-25	03-Dec-25
RGT-CNPM2380	Construction ICE Bridge (Liard River) IB 2	04-Dec-25	18-Dec-25
RGT-CNPM2485	Winter Road Construction - Connector road (GNWT)	19-Dec-25	11-Jan-26
RGT-CNPM1270	Build Winter Road to Pointed Mountain - Paramount Road (GNWT)	07-Jan-26	21-Jan-26
RGT-CNPM1280	Construction PM-1 KP0 (2wks Demo and 4 wks Remediation)	22-Jan-26	22-Jan-26
RGT-CNPM2440	Build Ice bridge (Kotaneelee River) - IB 3	22-Jan-26	22-Jan-26
RGT-CNPM2486	Winter Road Construction from PM-2 to PM-3	22-Jan-26	28-Jan-26
RGT-CNPM1290	Construction PM-2 KP11	01-Feb-26	05-Feb-26
RGT-CNPM1300	Construction PM-3 KP18	06-Feb-26	08-Feb-26
RGT-CNPM1310	Construction PM-4 KP19	09-Feb-26	11-Feb-26
RGT-CNPM2496	Construction PM-4A	09-Feb-26	18-Feb-26
RGT-CNPM1320	Demob from Camp	12-Feb-26	23-Feb-26
RGT-CNPM2410	Pointed Mountain - Remove Winter Access - South (Roll Back)	26-Feb-26	10-Mar-26
Q1198.2.2.3 Post Abandonment Environmental Monitoring Milestones		22-Sep-26	24-Sep-32
Q1198.2.2.3.2 Pointed Mountain		22-Sep-26	24-Sep-32
RGT-CL1120	Pointed Mountain Environment Monitoring - Year 1 (CER Order ZO-003-2024-Condition 10,11)	22-Sep-26	26-Sep-26
RGT-CL1140	Pointed Mountain Environment Monitoring - Year 3 (CER Order ZO-003-2024-Condition 10,11)	20-Sep-28	24-Sep-28
RGT-CL1160	Pointed Mountain Environment Monitoring - Year 5 (CER Order ZO-003-2024-Condition 10,11)	23-Sep-30	27-Sep-30
RGT-CL1170	Pointed Mountain Environment Monitoring - Year 7 (CER Order ZO-003-2024-Condition 10,11)	20-Sep-32	24-Sep-32



Remaining Level of Effort | Actual Work | Critical Remaining Work
Actual Level of Effort | Remaining Work | Milestone

TASK filter: KS : Pointed Mountain_MVLWB.
Page 1 of 1

*All dates are estimated and may be subject to change due to weather or other factors.

Appendix 5: Seed Mix

Seed Mix Information

Prioritize choosing local or northern seed sources for reclamation. Allow mineral wetlands and peatlands to naturally regenerate following construction; do not seed mineral wetlands or peatlands. Consider natural revegetation in other areas, to promote natural species distribution, especially in areas that do not have weed or erosion concerns. Use only Common No. 1 or Canada Certified No. 1 seed in reclamation seed mixes and confirm seed certificates of analysis are retained.

Verify absence of weed seeds, and that all seed certificates of analysis are submitted to Westcoast Environment prior to seed purchase. Westcoast Environment will review seed certificates of analysis when any other seed grade is proposed for reclamation projects, or a custom seed mix is used per a third-party requirement. When applicable, documented approval of proposed seed mix will be kept on file along with a copy of the seed certificate analysis.

Seeding should occur as soon as practical after final cleanup, as weather and soil conditions permit. Determine appropriate seeding method as per Section 16 of the EPP. Assess success of reclamation activities during post-construction monitoring, and record and correct reclamation deficiencies.

As described in Commission Clarifies Use of Ecologically Suitable Species (BC OGC 2020), ecologically suitable species should be used in British Columbia, and are prudent to use in the Yukon and Northwest Territories as well. The Yukon Revegetation Manual (Matheus and Omtzigt 2011) is a useful reference document. The following seed mixes are provided:

- Seed Mix A, for upland areas. This mix can be used for dormant seeding as these are cool season grasses.
- Seed Mix B, for riparian areas (disturbed banks). These species can be used for dormant seeding as they are cool season grasses.
- Short-lived Cover Crop, for soil stabilization of slopes or topsoil piles.

Seed Mix Recommendations

Seed Mix, Habitat Type[1,2,3]	Seeding Rate[4]
Seed Mix A, Upland: Fringed brome (*Bromus ciliatus*) (20%) Canada wild rye (*Elymus canadensis*) (20%) Rocky Mountain fescue (*Festuca saximontana*) (20%) Tufted hair grass (*Deschampsia cespitosa*) (15%) June grass (*Koeleria macrantha*) (15%) Hairy wild rye (*Leymus innovatus*) (10%) If needed due to species availability, potential substitutions to this mix can include: tickle grass (*Agrostis scabra*), glaucous bluegrass (*Poa glauca*), or bluejoint reedgrass (*Calamagrostis canadensis*).	Drill Seed at 12 to 14 kg/ha; or Broadcast/Hydroseed at 20 kg/ha

Seed Mix Recommendations

Seed Mix, Habitat Type[1,2,3]	Seeding Rate[4]
Seed Mix B, Riparian (disturbed banks): Preferred (to allow natural regeneration): Canadian wild rye (*Elymus canadensis*) (100%) Alternate (if seed mix needed, e.g., due to weed or erosion pressure): Canada wild rye (*Elymus canadensis*) (30%) Slough grass (*Beckmannia syzigachne*) (20%) Fringed brome (*Bromus ciliatus*) (20%) Tufted hair grass (*Deschampsia cespitosa*) (10%) June grass (*Koeleria macrantha*) (10%) If needed due to species availability, potential substitutions to this mix can include: bluejoint reedgrass (*Calamagrostis canadensis*), fowl bluegrass (*Poa palustris*) or polargrass (*Arctagrostis latifolia*). Do not seed mineral wetlands or peatlands (i.e., allow for natural regeneration) unless approved by Project-specific authorizations.	Preferred: Broadcast/Hydroseed at 5 kg/ha. Alternate: Broadcast/Hydroseed at 18-20 kg/ha.
Short-lived Cover Crop, soil stabilization for slopes or topsoil piles Species options include: annual ryegrass (*Lolium multiflorum*), fall ryegrass (*Lolium perenne*), or barley (*Hordeum vulgare*).	Broadcast/Hydroseed seed at 35-45 kg/ha.

Notes:

[1] Percentages are the desired, in situ composition, not the percentage that goes into the mix. The percentages that go into the mix need to be determined by the seed weight (# seeds/kg), purity (% of weight), and viability (% germination) of each species and seed lot.

[2] No soil amendments need to be incorporated into the soil during seedbed preparation.

[3] Seeding Timing: all species in this table are cool season grasses, so, both Seed Mix A and Seed Mix B can be used as dormant seeding (soil temperature is 2 degrees Celsius or cooler to prevent germination, soil is not frozen and snow is not present), or fall or spring seeding.

[4] After broadcast seeding, firm the seedbed with a harrow-packer or roller. For hydroseeding, if seed is applied alone (not in combination with hydromulch slurry), adjust the amount of hydromulch material to the seed slurry to show where seeding has taken place, to ensure uniform cover.

kg/ha = kilograms per hectare

References:

British Columbia Oil and Gas Commission (BC OGC). 2020. Commission Clarifies Use of Ecologically Suitable Species. Accessed September 2021. https://www.bcogc.ca/news/commission-clarifies-use-of-ecologically-suitable-species/

Matheus, P. and T. Omtzigt. 2011. Yukon Revegetation Manual – Practical Approaches and Methods. 176 pp.